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LED LCD TV
SERVICE MANUAL

CHASSIS : LA01R

MODEL : 22LV2500 22LV2500-UG

CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.

P/NO : MFL67234003 (1108-REV00)

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SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and Exploded View.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and it's components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1W), keep the resistor 10mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

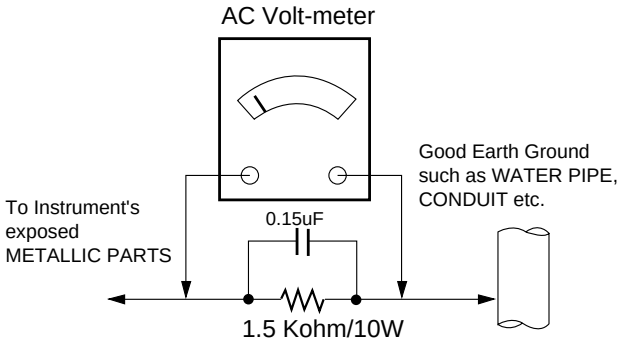
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)
With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.
If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1MΩ and 5.2MΩ.
When the exposed metal has no return path to the chassis the reading must be infinite.
An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)
Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.
Connect 1.5K/10watt resistor in parallel with a 0.15uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.
Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.
Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is corresponds to 0.5mA.
In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the *SAFETY PRECAUTIONS* on page 3 of this publication.
NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
   a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
   b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
   c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.
   CAUTION: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe.
   Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10% (by volume) Acetone and 90% (by volume) isopropyl alcohol (90%-99% strength)
   CAUTION: This is a flammable mixture.
   Unless specified otherwise in this service manual, lubrication of contacts in not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
   Always remove the test receiver ground lead last.
8. *Use with this receiver only the test fixtures specified in this service manual.*
   CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called *Electrostatically Sensitive (ES) Devices.* Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 500°F to 600°F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25cm) brush with a metal handle.
   Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
   a. Allow the soldering iron tip to reach normal temperature. (500°F to 600°F)
   b. Heat the component lead until the solder melts.
   c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
   a. Allow the soldering iron tip to reach a normal temperature (500°F to 600°F)
   b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
   c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
   d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

IC Remove/Replacement

Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal

1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement

1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas).

"Small-Signal" Discrete Transistor Removal/Replacement

1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

Power Output, Transistor Device Removal/Replacement

1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

Diode Removal/Replacement

1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

Fuse and Conventional Resistor Removal/Replacement

1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.
3. Solder the connections.
   CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

Circuit Board Foil Repair

Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

At IC Connections

To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections

Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side. Carefully crimp and solder the connections.
   CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. Application range

This spec sheet is applied LED LCD TV with 19”, 22” LA01R chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

1) Temperature: 25 ºC ± 5 ºC
2) Relative Humidity: 65 ± 10 %
3) Power Voltage : Standard input voltage(100-240V~, 50/60Hz)
   * Standard Voltage of each product is marked by models
4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
5) The receiver must be operated for about 5 minutes prior to the adjustment.

3. Test method

1) Performance: LGE TV test method followed
2) Demanded other specification
   - Safety : UL, CSA, IEC specification
   - EMC: FCC, ICES, IEC specification

4. General Specification(TV)

No	Item	Specification		Remark
1	Receivable System	1) ATSC / NTSC-M		
2	Available Channel	1) VHF : 02 ~ 13 2) UHF : 14 ~ 69 3) DTV : 02 ~ 69 4) CATV : 01 ~ 135 5) CADTV : 01 ~ 135		
3	Input Voltage	1) AC 100 - 240V~ 50/60Hz		Mark : 110V, 60Hz
4	Market	North America		
5	Screen Size	19 inch Wide (1366x768) 22 inch Wide (1366x768)	HD + 60Hz HD + 60Hz	19LV2500-UA/19LV2520-UC(AUO) 22LV2500-UA/22LV2520-UC(AUO)
6	Aspect Ratio	16:9		
7	Tuning System	FS		
8	LCD Module	M185XW01-VD M215HW01-VB	AUO AUO	19LV2500-UA/19LV2520-UC 22LV2500-UA/22LV2520-UC
9	Operating Environment	Temp : 0 ~ 40 deg Humidity : ~ 80 %		
10	Storage Environment	Temp : -20 ~ 60 deg Humidity : -85 %		

5. Chrominance & Luminance

No.	Item			Min	Typ	Max	Unit	Remarks
1	Max Luminance			240	300		cd/m^2	22LV2500-UG(AUO)
	(Center 1-point / Full White Pattern)			200	250			19LV2500-UG(AUO)
2	Luminance uniformity							
3	Color coordinate	RED	X	Typ.	0.635	Typ.		22LV2500-UG(AUO)
	(Default)		Y	-0.03	0.349	+0.03		
		GREEN	X		0.332			
			Y		0.619			
		BLUE	X		0.155			
			Y		0.055			
		WHITE	X		0.313			
			Y		0.329			
		RED	X	Typ.	0.634	Typ.		19LV2500-UG(AUO)
			Y	-0.03	0.351	+0.03		
		GREEN	X		0.334			
			Y		0.605			
		BLUE	X		0.146			
			Y		0.059			
		WHITE	X		0.313			
			Y		0.329			
4	Contrast ratio	Module		700	1000			22LV2500-UG(AUO)
				600	1000			19LV2500-UG(AUO)
		DCR		800,000:1	1,000,000:1			Global Dimming
5	Color Temperature	Cool		0.283	0.285	0.287	9300K	The W/B Tolerance is ±0.015
				0.291	0.293	0.295		for picture quality by DQA
		Medium		0.293	0.295	0.297	8000K	
				0.303	0.305	0.307		
		Warm		0.311	0.313	0.315	6500K	
				0.327	0.329	0.331		

6. Component Video Input (Y, C_B/P_B, C_R/P_R)

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock	Proposed
1.	720*480	15.73	60	13.5135	SDTV ,DVD 480I
2.	720*480	15.73	59.94	13.5	SDTV ,DVD 480I
3.	720*480	31.50	60	27.027	SDTV 480P
4.	720*480	31.47	59.94	27.0	SDTV 480P
5.	1280*720	45.00	60.00	74.25	HDTV 720P
6.	1280*720	44.96	59.94	74.176	HDTV 720P
7.	1920*1080	33.75	60.00	74.25	HDTV 1080I
8.	1920*1080	33.72	59.94	74.176	HDTV 1080I
9.	1920*1080	67.500	60	148.50	HDTV 1080P
10.	1920*1080	67.432	59.94	148.352	HDTV 1080P
11.	1920*1080	27.000	24.000	74.25	HDTV 1080P
12.	1920*1080	26.97	23.976	74.176	HDTV 1080P
13.	1920*1080	33.75	30.000	74.25	HDTV 1080P
14.	1920*1080	33.71	29.97	740176	HDTV 1080P

7. RGB Input (PC)

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock	Proposed	
	PC					DDC
1.	640*350	31.468	70.09	25.17	EGA	X
2.	720*400	31.469	70.08	28.32	DOS	O
3.	640*480	31.469	59.94	25.17	VESA(VGA)	O
4.	800*600	37.879	60.31	40.00	VESA(SVGA)	O
5.	1024*768	48.363	60.00	65.00	VESA(XGA)	O
6.	1280*768	47.776	59.870	79.5	CVT(WXGA)	X
7.	1360*768	47.712	60.015	85.50	VESA(WXGA)	X

8. HDMI input (PC/DTV)

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock	Proposed	
	PC					DDC
1.	640*350	31.468	70.09	25.17	EGA	X
2.	720*400	31.469	70.08	28.32	DOS	O
3.	640*480	31.469	59.94	25.17	VESA(VGA)	X
4.	800*600	37.879	60.31	40.00	VESA(SVGA)	O
5.	1024*768	48.363	60.00	65.00	VESA(XGA)	O
6.	1280*768	47.776	59.870	79.5	CVT(WXGA)	X
7.	1360*768	47.712	60.015	85.50	VESA (WXGA)	O
	DTV					
1	720*480	31.47	60	27.027	SDTV 480P	O
2	720*480	31.47	59.94	27.00	SDTV 480P	O
3	1280*720	45.00	60.00	74.25	HDTV 720P	O
4	1280*720	44.96	59.94	74.176	HDTV 720P	O
5	1920*1080	33.75	60.00	74.25	HDTV 1080I	O
6	1920*1080	33.72	59.94	74.176	HDTV 1080I	O
7	1920*1080	67.500	60	148.50	HDTV 1080P	O
8	1920*1080	67.432	59.939	148.352	HDTV 1080P	O
9	1920*1080	27.000	24.000	74.25	HDTV 1080P	O
10	1920*1080	26.97	23.976	74.176	HDTV 1080P	O
11	1920*1080	33.75	30.000	74.25	HDTV 1080P	O
12	1920*1080	33.71	29.97	74.176	HDTV 1080P	O

ADJUSTMENT INSTRUCTION

1. Application range

This spec. sheet applies to LA01R Chassis applied LCD TV all models manufactured in TV factory.

2. Specification

2.1 Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.

2.2 Adjustment must be done in the correct order.

2.3 The adjustment must be performed in the circumstance of 25±5°C of temperature and 65±10% of relative humidity

2.4 The input voltage of the receiver must keep 100~240V~, 50/60Hz.

2.5 At first Worker must turn on the SET by using Power Only key.

2.5 The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15.

In case of keeping module is in the circumstance of 0°C, it should be placed in the circumstance of above 15°C for 2 hours

In case of keeping module is in the circumstance of below -20°C, it should be placed in the circumstance of above 15°C for 3 hours.

• Caution

When a still image is displayed for 20 minutes or longer (especially where W/B scale is strong. Digital pattern 13ch and/or Cross hatch pattern 09ch), there can some afterimage in the black level area.

3. Adjustment items

3.1 Board Level Adjustment

(1) Adjust 1080p/480i Component(ADC)
(2) EDID/DDC download

• Remark
- Above adjustment items can be also performed in Final Assembly if needed. Adjustment items in both PCBA and final assembly stages can be checked by using the INSTART Menu 1.ADJUST CHECK.

3.2 Final Assembly adjustment

(1) White Balance adjustment
(2) RS-232C functionality check
(3) Factory Option setting per destination
(4) Shipment mode setting (IN-STOP)

3.3 Etc

(1) Ship-out mode
(2) Service Option Default
(3) USB Download(S/W Update, Option, Service only)
(4) ISP Download (Optional)

4. Board Level Adjustment

4.1. ADC Adjustment

4.1.1. Overview

• ADC adjustment is needed to find the optimum black level and gain in Analog-to-Digital device and to compensate RGB deviation.

4.1.2. Equipment & Condition

1) Jig (RS-232C protocol)
• Required equipment : Adjustment R/C

*Enter Service Mode by pushing “ADJ” key,

*Enter Internal ADC mode by pushing “G” key at “6. ADC Calibration”

4.1.3. Adjustment

4.1.3.1 Adjustment method

• Using RS-232, adjust items listed in 3.1 in the other shown in “4.1.3.3”

4.1.3.2 Adj. protocol

Protocol	Command	SetACK
Enter adj. mode	aa 00 00	a 00 OK00x
Source change	xb 00 40 xb 00 60	b 00 OK40x (Adjust 480i/1080p Comp1) b 00 OK60x (Adjust 1920*1080 RGB)
Begin adj.	ad 00 10	
Return adj. result		OKx (Case of Success) NGx (Case of Fail)
Read adj. data	(main) ad 00 20 (sub) ad 00 21	(main) 00000000000000000000000007c007b006dx (Sub) 00000007000000000000000007c00830077x
Confirm adj.	ad 00 99	NG 03 00x (Fail) NG 03 01x (Fail) NG 03 02x (Fail) OK 03 03x (Success)
End adj.	aa 00 90	a 00 OK90x

Ref.) ADC Adj. RS232C Protocol_Ver1.0

4.1.3.3. Adj. order

• aa 00 00 [Enter ADC adj. mode]
• xb 00 40 [Change input source to Component1(1080i)]
• ad 00 10 [Adjust 480i Comp1]
• xb 00 60 [Change input source to RGB(1024*768)]
• ad 00 10 [Adjust 1024*768 RGB]
• ad 00 90 End adj.

Ref) ADC adj. RS232C Protocol_Ver1.0

4.2. EDID/DDC Download

4.2.1 Overview

- It is a VESA regulation. A PC or a MNT will display an optimal resolution through information sharing without any necessity of user input. It is a realization of “Plug and Play”.

4.2.2 Equipment

- Since embedded EDID data is used, EDID download JIG, HDMI cable and D-sub cable are not need.
- Adjust remocon.

4.2.3 Download method

1) Press Adj. key on the Adj. R/C,
2) Select EDID D/L menu.
3) By pressing Enter key, EDID download will begin
4) If Download is successful, OK is display, but If Download is failure, NG is displayed.
5) If Download is failure, Re-try downloads.

* Caution) When EDID Download, must remove RGB/HDMI Cable.

4.2.4 EDID DATA

1) North America

1-1) FHD Model(22LV2500-UG0

■ HDMI 1-FHD-8BIT (C/S : 0304)
EDID Block 0, Bytes 0-127 [00H-7FH]

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	15	01	03	80	10	09	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	81	80	61	40	45	40	31	40	01	01
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	01	1D	00	72	51	D0	1E	20
50	6E	28	55	00	A0	5A	00	00	00	1E	00	00	00	FD	00	39
60	3F	1F	52	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	03

EDID Block 1, Bytes 128-255 [80H-FFH]

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	02	03	1C	F1	47	10	22	20	05	84	03	02	23	09	07	07
10	67	03	0C	00	10	00	80	2D	E3	05	03	01	02	3A	80	18
20	71	38	2D	40	58	2C	04	05	A0	5A	00	00	00	1E	01	1D
30	80	18	71	1C	16	20	58	2C	25	00	A0	5A	00	00	00	9E
40	01	1D	00	72	51	D0	1E	20	6E	28	55	00	A0	5A	00	00
50	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00	A0	5A
60	00	00	00	18	26	36	80	A0	70	38	1F	40	30	20	25	00
70	A0	5A	00	00	00	1A	00	00	00	00	00	00	00	00	00	04

■ HDMI 2-FHD-8BIT (C/S : 03F4)
EDID Block 0, Bytes 0-127 [00H-7FH]

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	15	01	03	80	10	09	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	81	80	61	40	45	40	31	40	01	01
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	01	1D	00	72	51	D0	1E	20
50	6E	28	55	00	A0	5A	00	00	00	1E	00	00	00	FD	00	39
60	3F	1F	52	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	03

EDID Block 1, Bytes 128-255 [80H-FFH]

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	02	03	1C	F1	47	10	22	20	05	84	03	02	23	09	07	07
10	67	03	0C	00	20	00	80	2D	E3	05	03	01	02	3A	80	18
20	71	38	2D	40	58	2C	04	05	A0	5A	00	00	00	1E	01	1D
30	80	18	71	1C	16	20	58	2C	25	00	A0	5A	00	00	00	9E
40	01	1D	00	72	51	D0	1E	20	6E	28	55	00	A0	5A	00	00
50	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00	A0	5A
60	00	00	00	18	26	36	80	A0	70	38	1F	40	30	20	25	00
70	A0	5A	00	00	00	1A	00	00	00	00	00	00	00	00	00	F4

■ HDMI 3-FHD-8BIT (C/S : 03E4)
EDID Block 0, Bytes 0-127 [00H-7FH]

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	15	01	03	80	10	09	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	81	80	61	40	45	40	31	40	01	01
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	01	1D	00	72	51	D0	1E	20
50	6E	28	55	00	A0	5A	00	00	00	1E	00	00	00	FD	00	39
60	3F	1F	52	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	01	03

EDID Block 1, Bytes 128-255 [80H-FFH]

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	02	03	1C	F1	47	10	22	20	05	84	03	02	23	09	07	07
10	67	03	0C	00	30	00	80	2D	E3	05	03	01	02	3A	80	18
20	71	38	2D	40	58	2C	04	05	A0	5A	00	00	00	1E	01	1D
30	80	18	71	1C	16	20	58	2C	25	00	A0	5A	00	00	00	9E
40	01	1D	00	72	51	D0	1E	20	6E	28	55	00	A0	5A	00	00
50	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00	A0	5A
60	00	00	00	18	26	36	80	A0	70	38	1F	40	30	20	25	00
70	A0	5A	00	00	00	1A	00	00	00	00	00	00	00	00	00	E4

■ RGB-FHD (C/S : ED)
EDID Block 0, Bytes 0-127 [00H-7FH]

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01	01	01
10	01	15	01	03	68	10	09	78	0A	EE	91	A3	54	4C	99	26
20	0F	50	54	A1	08	00	81	80	61	40	45	40	31	40	01	01
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00	00	FC
70	00	4C	47	20	54	56	0A	20	20	20	20	20	20	20	00	ED

1-2) HD Model (19LV2500)

■ HDMI 1-HD (C/S : 1B74)
EDID Block 0, Bytes 0-127 [00H-7FH]

```
    0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
   ------------------------------------------------
0 | 00 FF FF FF FF FF FF 00 1E 6D 01 00 01 01 01 01
10 | 01 15 01 03 80 73 41 78 0A CF 74 A3 57 4C B0 23
20 | 09 48 4C A1 08 00 81 C0 01 01 01 01 01 01 01 01
30 | 01 01 01 01 01 01 66 21 50 B0 51 00 1B 30 40 70
40 | 36 00 7E 8A 42 00 00 1E 01 1D 00 72 51 D0 1E 20
50 | 6E 28 55 00 7E 8A 42 00 00 1E 00 00 00 FD 00 39
60 | 3F 1F 3C 09 00 0A 20 20 20 20 20 20 00 00 00 FC
70 | 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 01 1B
```

EDID Block 1, Bytes 128-255 [80H-FFH]

```
    0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
   ------------------------------------------------
0 | 02 03 1C F1 47 10 22 20 05 84 03 02 23 09 07 07
10 | 67 03 0C 00 10 00 80 2D E3 05 03 01 02 3A 80 18
20 | 71 38 2D 40 58 2C 04 05 7E 8A 42 00 00 1E 01 1D
30 | 80 18 71 1C 16 20 58 2C 25 00 7E 8A 42 00 00 9E
40 | 01 1D 00 72 51 D0 1E 20 6E 28 55 00 7E 8A 42 00
50 | 00 1E 8C 0A D0 8A 20 E0 2D 10 10 3E 96 00 7E 8A
60 | 42 00 00 18 26 36 80 A0 70 38 1F 40 30 20 25 00
70 | 7E 8A 42 00 00 1A 00 00 00 00 00 00 00 00 00 74
```

■ HDMI 2-HD (C/S : 1B64)
EDID Block 0, Bytes 0-127 [00H-7FH]

```
    0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
   ------------------------------------------------
0 | 00 FF FF FF FF FF FF 00 1E 6D 01 00 01 01 01 01
10 | 01 15 01 03 80 73 41 78 0A CF 74 A3 57 4C B0 23
20 | 09 48 4C A1 08 00 81 C0 01 01 01 01 01 01 01 01
30 | 01 01 01 01 01 01 66 21 50 B0 51 00 1B 30 40 70
40 | 36 00 7E 8A 42 00 00 1E 01 1D 00 72 51 D0 1E 20
50 | 6E 28 55 00 7E 8A 42 00 00 1E 00 00 00 FD 00 39
60 | 3F 1F 3C 09 00 0A 20 20 20 20 20 20 00 00 00 FC
70 | 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 01 1B
```

EDID Block 1, Bytes 128-255 [80H-FFH]

```
    0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
   ------------------------------------------------
0 | 02 03 1C F1 47 10 22 20 05 84 03 02 23 09 07 07
10 | 67 03 0C 00 20 00 80 2D E3 05 03 01 02 3A 80 18
20 | 71 38 2D 40 58 2C 04 05 7E 8A 42 00 00 1E 01 1D
30 | 80 18 71 1C 16 20 58 2C 25 00 7E 8A 42 00 00 9E
40 | 01 1D 00 72 51 D0 1E 20 6E 28 55 00 7E 8A 42 00
50 | 00 1E 8C 0A D0 8A 20 E0 2D 10 10 3E 96 00 7E 8A
60 | 42 00 00 18 26 36 80 A0 70 38 1F 40 30 20 25 00
70 | 7E 8A 42 00 00 1A 00 00 00 00 00 00 00 00 00 64
```

■ HDMI 3-HD (C/S : 1B54)
EDID Block 0, Bytes 0-127 [00H-7FH]

```
    0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
   ------------------------------------------------
0 | 00 FF FF FF FF FF FF 00 1E 6D 01 00 01 01 01 01
10 | 01 15 01 03 80 73 41 78 0A CF 74 A3 57 4C B0 23
20 | 09 48 4C A1 08 00 81 C0 01 01 01 01 01 01 01 01
30 | 01 01 01 01 01 01 66 21 50 B0 51 00 1B 30 40 70
40 | 36 00 7E 8A 42 00 00 1E 01 1D 00 72 51 D0 1E 20
50 | 6E 28 55 00 7E 8A 42 00 00 1E 00 00 00 FD 00 39
60 | 3F 1F 3C 09 00 0A 20 20 20 20 20 20 00 00 00 FC
70 | 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 01 1B
```

EDID Block 1, Bytes 128-255 [80H-FFH]

```
    0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
   ------------------------------------------------
0 | 02 03 1C F1 47 10 22 20 05 84 03 02 23 09 07 07
10 | 67 03 0C 00 30 00 80 2D E3 05 03 01 02 3A 80 18
20 | 71 38 2D 40 58 2C 04 05 7E 8A 42 00 00 1E 01 1D
30 | 80 18 71 1C 16 20 58 2C 25 00 7E 8A 42 00 00 9E
40 | 01 1D 00 72 51 D0 1E 20 6E 28 55 00 7E 8A 42 00
50 | 00 1E 8C 0A D0 8A 20 E0 2D 10 10 3E 96 00 7E 8A
60 | 42 00 00 18 26 36 80 A0 70 38 1F 40 30 20 25 00
70 | 7E 8A 42 00 00 1A 00 00 00 00 00 00 00 00 00 54
```

■ RGB-HD (C/S : 6F)
EDID Block 0, Bytes 0-127 [00H-7FH]

```
    0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
   ------------------------------------------------
 0 | 00 FF FF FF FF FF FF 00 1E 6D 01 00 01 01 01 01
10 | 01 15 01 03 68 73 41 78 0A CF 30 A3 57 4C B0 23
20 | 09 50 4E A1 08 00 81 C0 01 01 01 01 01 00 01 01
30 | 01 01 01 01 01 01 66 21 50 B0 51 00 1B 30 40 70
40 | 36 00 7E 8A 42 00 00 1E 01 1D 00 72 51 D0 1E 20
50 | 6E 28 55 00 7E 8A 42 00 00 1E 00 00 00 FD 00 39
60 | 3F 1F 3C 09 00 0A 20 20 20 20 20 20 00 00 00 FC
70 | 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20 00 6F
```

5. Final Assembly Adjustment

5.1. White Balance Adjustment

5.1.1. Overview

5.1.1.1. W/B adj. Objective & How-it-works

(1) Objective: To reduce each Panel's W/B deviation

(2) How-it-works: When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.

(3) Adj. condition: normal temperature

1) Surrounding Temperature: 25±5°C

2) Warm-up time: About 5 Min

3) Surrounding Humidity: 20% ~ 80%

5.1.2. Equipment

(1) Color Analyzer: CA-210 (NCG: CH 9 / WCG: CH12 / LED: CH14)

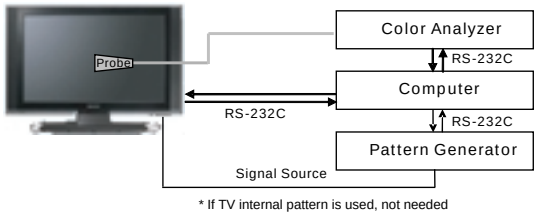
(2) Adj. Computer (During auto adj., RS-232C protocol is needed)

(3) Adjust Remocon

(4) Video Signal Generator MSPG-925F 720p/204-Gray (Model: 217, Pattern: 49)

• Color Analyzer Matrix should be calibrated using CS-1000

5.1.3. Equipment connection



Connection Diagram of Automatic Adjustment

5.1.4. Adjustment Command (Protocol)

(1) RS-232C Command used during auto-adj.

RS-232C COMMAND [CMD	ID	DATA]	Explanation
Wb	00	00	Begin White Balance adj.
Wb	00	ff	End White Balance adj. (internal pattern disappears)

Ex) wb 00 00 -> Begin white balance auto-adj.
wb 00 10 -> Gain adj.
ja 00 ff -> Adj. data
jb 00 c0
...
...
wb 00 1f -> Gain adj. complete
*(wb 00 20(start), wb 00 2f(end)) -> Off-set adj.
wb 00 ff ->End white balance auto adj.

(2) Adj. Map
Applied Model :
19/22LV2500-UG

Adj.	item	Command (lower case ASCII)		Data Range (Hex.)		Default (Decimal)
		CMD1	CMD2	MIN	MAX	
Cool	R Gain	j	g	00	C0	172
	G Gain	j	h	00	C0	172
	B Gain	j	i	00	C0	192
	R Cut					64
	G Cut					64
	B Cut					64
Medium	R Gain	j	a	00	C0	192
	G Gain	j	b	00	C0	192
	B Gain	j	c	00	C0	192
	R Cut					64
	G Cut					64
	B Cut					64
Warm	R Gain	j	d	00	C0	192
	G Gain	j	e	00	C0	192
	B Gain	j	f	00	C0	172
	R Cut					64
	G Cut					64
	B Cut					64

5.1.5. Adjustment method

5.1.5.1 Auto WB calibration

1) Set TV in adj. mode using POWER ONLY (P-ONLY) key

2) Zero calibrate probe then place it on the center of the Display

3) Connect Cable(RS-232C)

4) Select mode in adj. Program and begin adj.

5) When adj. is complete (OK Sing), check adj. status pre mode (Cool, Medium, Warm)

6) Remove probe and RS-232C cable to complete adj.

• W/B Adj. must begin as start command "wb 00 00" , and finish as end command "wb 00 ff", and Adj. offset if need

5.1.5.2 Manual adj. method

1) Set TV in Adj. mode using POWER ON

2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10cm of the surface..

3) Press ADJ key -> EZ adjust using adj. R/C 6. White-Balance then press the cursor to the right (KEY G). (When KEY(G) is pressed 204 Gray(80IRE) internal pattern will be displayed)

4) One of R Gain / G Gain / B Gain should be fixed at 192, and the rest will be lowered to meet the desired value.

5) Adj. is performed in COOL, MEDIUM, WARM 3 modes of color temperature.

• If internal pattern is not available, use RF input. In EZ Adj. menu 6.White Balance, you can select one of 2 Test-pattern: ON, OFF. Default is inner(ON). By selecting OFF, you can adjust using RF signal in 204 Gray pattern.

• Adj. condition and cautionary items

1) Lighting condition in surrounding area
Surrounding lighting should be lower 10 lux. Try to isolate adj. area into dark surrounding.

2) Probe location : Color Analyzer (CA-210) probe should be within 10cm and perpendicular of the module surface (80°~ 100°)

3) Aging time

- After Aging Start, Keep the Power ON status during 5 Minutes.
- In case of LCD, Back-light on should be checked using no signal or Full-white pattern.

5.1.6 Reference (White Balance Adj. coordinate and color temperature)

(1) Luminance: 204 Gray, 80IRE

(2) Standard color coordinate and temperature using CA-210(CH 14)

Mode	Color Coordination		Temp	ΔUV
	x	y		
COOL	0.285±0.002	0.293±0.002	9300K	0.0000
MEDIUM	0.295±0.002	0.305±0.002	8000K	0.0000
WARM	0.313+0.002	0.329±0.002	6500K	0.0000

5.2 HDCP (High-Bandwidth Digital Contents Protection) SETTING

5.3 Option selection per country

5.3.1 Overview

• Option selection is only done for models in Non-USA North America due to rating

• Applied model: LA01U Chassis applied None USA model(CANADA, MEXICO)

5.3.2 Method

(1) Press ADJ key on the Adj. R/C, and then select Country Group Menu

(2) Depending on destination, select KR or US, then on the lower Country option, select US, CA, MX. Selection is done using +, - KEY

5.4 Tool Option selection

• Method: Press Adj. key on the Adj. R/C, then select Tool option.

Model	Tool1	Tool2	Tool3	Tool4	Tool5	Menu
22LV2500-UG	10024	18954	55337	2588	16640	AUO
19LV2500-UG	5928	18954	55337	2588	16640	AUO

5.6 3D Pattern test(Only 3D model)

5.6.1 Test equipment

(1) Pattern Generator MSHG-600 or MSPG-6100 (HDMI 1.4 support)

(2) Pattern: HDMI mode (model No. 872, pattern No. 83)

5.6.2 Test method

(1) Input 3D test signal as Fig.1.

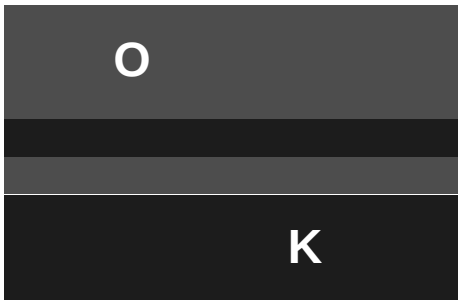


Fig.1
<HDMI Mode 872, Pattern No.83

(2) Press ‘OK” key as a 3D input OSD is shown.

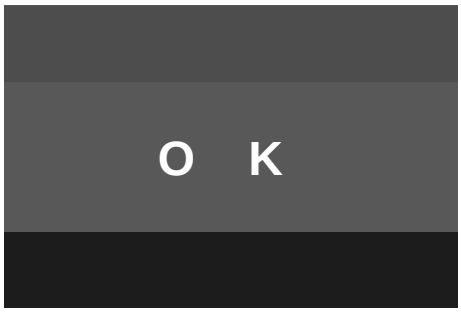


Fig.2
<OK in 3D mode without 3D glasses>

(3) Check pattern as Fig2 without 3D glasses. (3D mode without 3D glasses)

Fig.3
<NG in 3D mode without 3D glasses>

5.7 Local Dimming Inspection (Only Local dimming model)

(1) Press 'TILT' Key of the Adj. R/C and check moving patterns. The black bar patterns moves from top to boeeom. If a local dimming function does not work, a whole screen shows full white.

5.8 Ship-out mode check (In-stop)

(1) After final inspection, press In-Stop key of the Adj. R/C and check that the unit goes to Stand-by model.

6. GND and Hi-pot Test

6.1. Method

6.1.1. GND & HI-POT auto-check preparation

(1) Check the POWER CABLE and SIGNAL CABE insertion condition

6.1.2. GND & HI-POT auto-check

(1) Pallet moves in the station. (POWER CORD / AV CORD is tightly inserted)

(2) Connect the AV JACK Tester.

(3) Controller (GWS103-4) on.

(4) GND Test (Auto)

- If Test is failed, Buzzer operates.
- If Test is passed, execute next process (Hi-pot test). (Remove A/V CORD from A/V JACK BOX)

(5) HI-POT test (Auto)

- If Test is failed, Buzzer operates.
- If Test is passed, GOOD Lamp on and move to next process automatically.

6.2. Checkpoint

• TEST voltage
- GND: 1.5KV/min at 100mA
- SIGNAL: 3KV/min at 100mA

• TEST time: 1 second

• TEST POINT
- GND TEST = POWER CORD GND & SIGNAL CABLE METAL GND
- Internal Pressure TEST = POWER CORD GND & LIVE & NEUTRAL

• LEAKAGE CURRENT: At 0.5mArms

7. EYE-Q Check

Step 1) Turn on the TV.

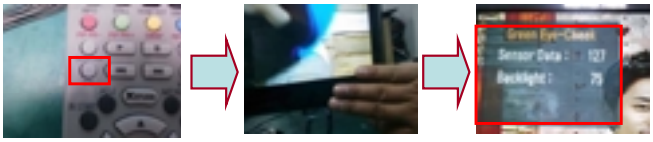
Step 2) Press EYE button in adjust remote control.

Step 3) Stay 6 seconds with Eye Q sensor hidden located on the front of the set.

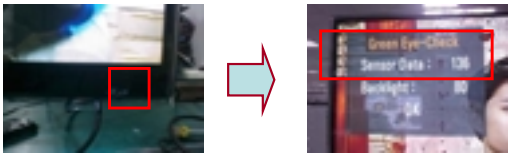
Step 4) Check the "Sensor Data" on the screen and check whether the value is lower thanafter 6 seconds, the value does not go below 10, Eye Q sensor is not working properly. Then, change the sensor.

Step 5) Remove hand from the Eye Q II sensor and stay for 6 seconds.

Step 6) Check whether the "Back Light (xxx)" value has risen on the screen. If after 6 seconds and the value still does not go high, the eye Q II sensor is not working properly. Replace the sensor.



<Step1> <Step2> <Step3>



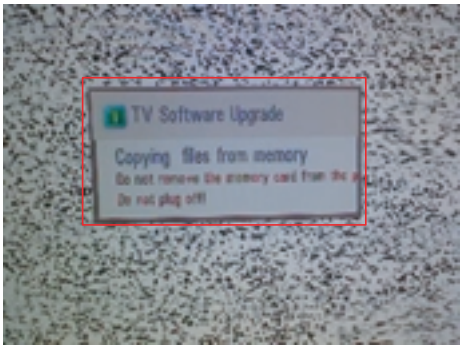
<Step4> <Step5>

8. USB S/W Download (Option, Service only)

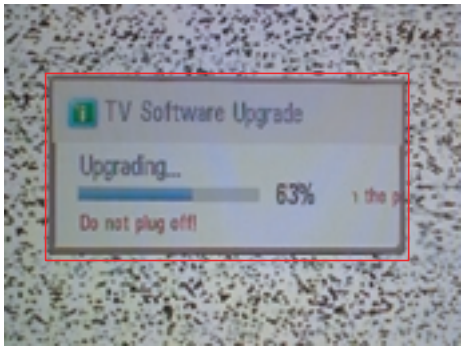
1. Put the USB Stick to the USB socket
2. Automatically detecting update file in USB Stick

- If your downloaded program version in USB Stick is Low, it didn't work. But your downloaded version is High, USB data is automatically detecting

3. Show the message "Copying files from memory"



4. Updating is starting.



5. Updating Completed, The TV will restart automatically
6. If your TV is turned on, check your updated version and Tool option. (Explain the Tool option, next stage)

* If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn't have a DTV/ATV test on production line.

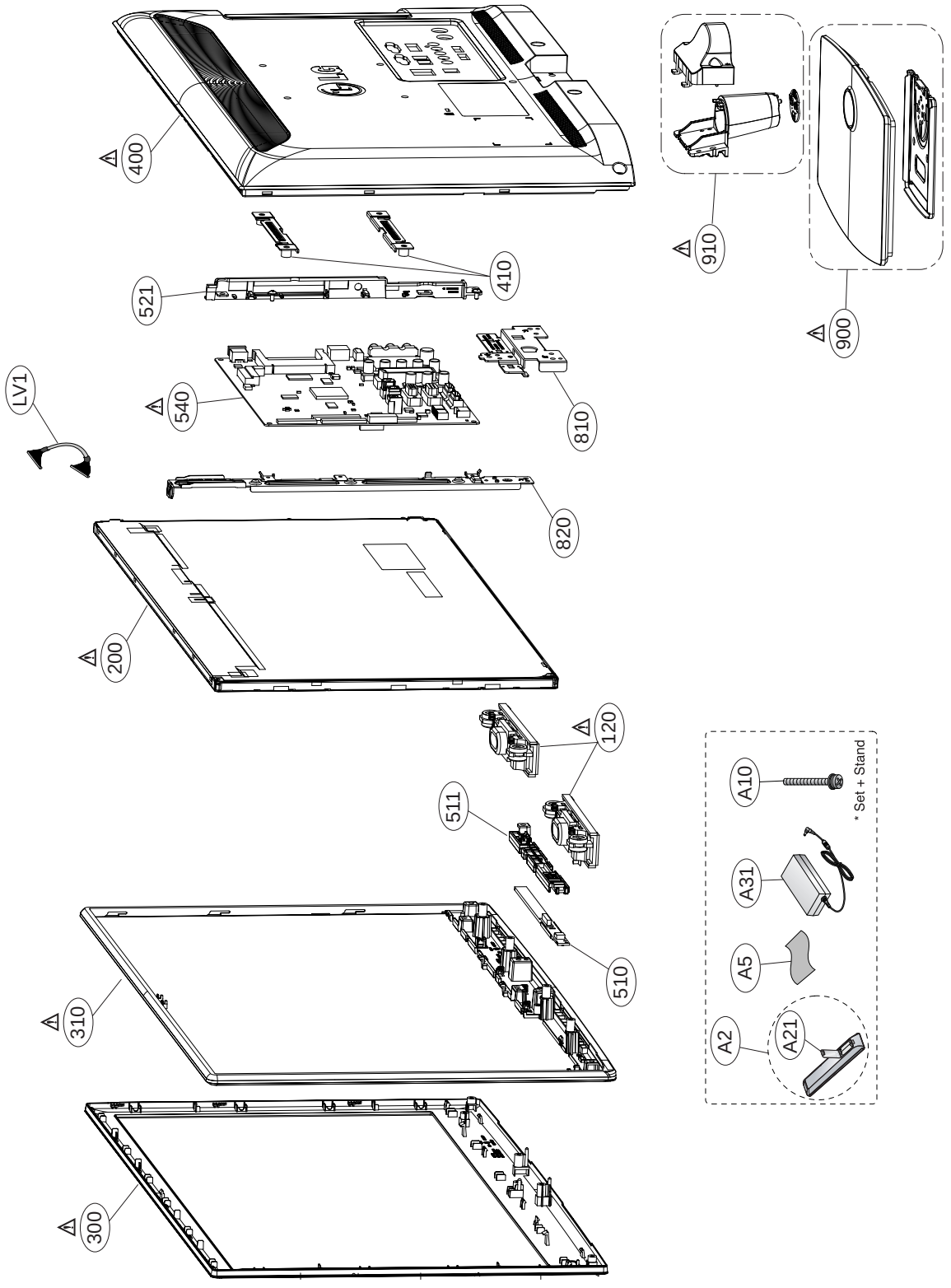
*** After downloading, have to adjust TOOL OPTION again.**

1. Push "IN-START" key in service remote controller.
2. Select "Tool Option 1" and Push "OK" button.
3. Punch in the number. (Each model has their number.)

EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and EXPLODED VIEW.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.



NAND FLASH MEMORY

IC102
NAND01GW3B2CN6E
NAND_FLASH_1G_NUMONYX
EAN60762401

+3.3V_Normal

NC_1 NC_2 NC_3 NC_4 NC_5 NC_6 RB EN CE NC_7 NC_8 VDD_1 VSS_1 NC_9 NC_10 CL AL WP NC_11 NC_12 NC_13 NC_14 NC_15

NC_29 NC_28 NC_27 NC_26 I/O7 I/O6 I/O5 I/O4 NC_25 NC_24 NC_23 VDD_2 VSS_2 NC_22 NC_21 NC_20 I/O3 I/O2 I/O1 I/O0 NC_19 NC_18 NC_17 NC_16

/F_RB
/PF_OE
/PF_CE0
/PF_CE1
PF_ALE
/PF_WE
/PF_WP

R107 1K
R108 1.9K
R103 3.3K OPT
C101 0.1uF
R105 1K OPT
R104 10K OPT
R106 10K
Q101 KRC103S OPT
R102 3.3K

22 AR101
PCM_A[7] PCM_A[6] PCM_A[5] PCM_A[4]

C102 10nF
C103 0.1uF

AR102 22
PCM_A[3] PCM_A[2] PCM_A[1] PCM_A[0]

PCM_A[0-7]

<CHIP Config(LED_R/BUZZ)>

Boot from SPI CS1N(EXT_FLASH) 1'b0
Boot from SPI_CS0N(INT_FLASH) 1'b1

<CHIP Config>
(I2S_OUT_BCK,I2S_OUT_MCK,PAD_PWM1PAD_PWM0)

BS1_no_EJ	: 4'b0000	Boot from 8051 with SPI flash
SB51_WOS	: 4'b0001	Secure 8051 without scramble
SB51_WS	: 4'b0010	Secure 8051 with scramble
MIPS_SPE_NO_EJ	: 4'b0100	Boot from MIPS with SPI flash
MIPS_SPI_EJ_1	: 4'b0101	Boot from MIPS with SPI flash
MIPS_SPI_EJ_2	: 4'b0110	Boot from MIPS with SPI flash
MIPS_WOS	: 4'b1001	Secure MIPS without scramble
MIPS_WS	: 4'b1010	Scerur MIPS with SCRAMBLE

+3.3V_Normal

R115 OPT R117 OPT R115 OPT R123 OPT R122 OPT

AUD_MASTER_CLK
C112 100pF 50V
R148 56

LED_R/BUZZ
AUD_SCK
AUD_MASTER_CLK_0
PWM1
PWM0

R116 1K R118 1K R121 1K R124 1K R53 1K

IC101
LGE2112-T8

S7LR_DIVX_MS10

PCM_D[0-7]
PCM_D[0] PCM_D[1] PCM_D[2] PCM_D[3] PCM_D[4] PCM_D[5] PCM_D[6] PCM_D[7]
W21 AA18 AB22 AE20 AA15 AE21 AB21 Y15

PCM_A[0-14]
PCM_A[0] PCM_A[1] PCM_A[2] PCM_A[3] PCM_A[4] PCM_A[5] PCM_A[6] PCM_A[7] PCM_A[8] PCM_A[9] PCM_A[10] PCM_A[11] PCM_A[12] PCM_A[13] PCM_A[14]
W20 V20 W22 AB18 AA20 AA21 Y19 AB17 Y16 AB19 AB20 AA16 AA19 AC21 AA17

/PCM_REG
Y20

/PCM_OE
/PCM_WE
/PCM_IORD
/PCM_IOWR
AB15 AA22 AD22 AD20

/PCM_CE
/PCM_IRQA
/PCM_CD
/PCM_WAIT
PCM_RST
AD21 AC20 Y18 Y21 Y22

+5V_Normal
R132 10K
R133 10K
C108 0.1uF OPT
C109 0.1uF

/CI_CD1
/CI_CD2
OPT R120 22
OPT R122 22

USB1_OCD
USB1_CTL
U21 V21 R20

PCM_5V_CTL
ERROR_OUT
T20 U22

to delete CI or gate for

PCM2_CE_N/GPIO131
PCM2_IRQA_N/GPIO132
PCM2_CD_N/GPIO135
PCM2_WAIT_N/GPIO133
PCM2_RESET/GPIO134
D4 E4 N25 N24 B8 A8

UART1_TX/GPIO43
UART1_RX/GPIO44
UART2_TX/GPIO65
UART2_RX/GPIO64
UART3_TX/GPIO47
UART3_RX/GPIO48

PM_TXD
PM_RXD
MODEL_OPT_6
MODEL_OPT_7
R130 22
R131 22

for SYSTEM/HDCP EEPROM&URSA3

I2C_SCL
I2C_SDA
R136 22
R137 22
P23 P24

RGB_DDC_SDA
RGB_DDC_SCL
R138 22
R139 22
D2 D1

DDCA_DA/UART0_TX
DDCA_CK/UART0_RX

PWM0
PWM1
PWM2
LED_B/LG_LOGO
LED_R/BUZZ
P21 N23 P22 R21 P20

PWM0/GPIO66
PWM1/GPIO67
PWM2/GPIO68
PWM3/GPIO69
PWM4/GPIO70
PWM_PM/GPIO199

R119 22
F6

+3.5V_ST
TOUCH_KEY
R143 4.7K
R113 4.7K
TOUCH_KEY

KEY1
KEY2
H6 G5 G4

SAR0/GPIO31
SAR1/GPIO32
SAR2/GPIO33
SAR3/GPIO34
SAR4/GPIO35

S/T_SDA
S/T_SCL
R101 22
R163 22
R164 22
J5 J4

SCART1_MUTE

R166 22
R23

R167 22
R168 22
R169 22
R170 22
R24 R25 T21 T22

SENSOR_SCL
SENSOR_DA

VSYNC_LIKE/GPIO145

SPI1_CK/GPIO201
SPI1_DI/GPIO202
SPI2_CK/GPIO203
SPI2_DI/GPIO204

NF_CE1Z/GPIO138
NF_WPZ/GPIO198
NF_CEZ/GPIO137
NF_CLE/GPIO136
NF_REZ/GPIO139
NF_WEZ/GPIO140
NF_ALE/GPIO141
NF_RBZ/GPIO142

AR103 22
/PF_WP
/PF_CE0
/PF_CE1
/PF_OE
/PF_WE
PF_ALE
/F_RB
AR104 22

GPIO_PM[0]/GPIO6
PM_UART_TX/GPIO_PM[1]/GPIO7
GPIO_PM[2]/GPIO8
GPIO_PM[3]/GPIO9
GPIO_PM[4]/GPIO10
PM_UART_RX/GPIO_PM[5]/GPIO11
PM_SPI_SCZ1/GPIO_PM[6]/GPIO12
GPIO_PM[7]/GPIO13
GPIO_PM[8]/GPIO14
GPIO_PM[9]/GPIO15
PM_SPI_SCZZ/GPIO_PM[10]/GPIO16
GPIO_PM[11]/GPIO17

PM_SPI_SCK/GPIO1
PM_SPI_CZ0/GPIO_PM[12]/GPIO0
PM_SPI_SDI/GPIO2
PM_SPI_SDO/GPIO3

POWER_DET
PM_TXD
INV_CTL
RL_ON
POWER_ON/OFF_1
PM_RXD
/FLASH_WP
SIDE_HP_MUTE
PANEL_CTL
PM_MODEL_OPT_0
AMP_MUTE

R134 22
R135 22
R110 22
R114 22
R142 22
R147 33
R146 22
R151 33
R154 33 22 OPT

SPI_SCK
/SPI_CS
SPI_SDI
SPI_SDO

for SERIAL FLASH

TS0CLK/GPIO87
TS0VALID/GPIO85
TS0SYNC/GPIO86

TS0DATA_[0]/GPIO77
TS0DATA_[1]/GPIO78
TS0DATA_[2]/GPIO79
TS0DATA_[3]/GPIO80
TS0DATA_[4]/GPIO81
TS0DATA_[5]/GPIO82
TS0DATA_[6]/GPIO83
TS0DATA_[7]/GPIO84

CI_TS_CLK
CI_TS_VAL
CI_TS_SYNC
CI_TS_DATA[0-7]

from CI SLOT

TS1CLK/GPIO98
TS1VALID/GPIO96
TS1SYNC/GPIO97

TS1DATA_[0]/GPIO88
TS1DATA_[1]/GPIO89
TS1DATA_[2]/GPIO90
TS1DATA_[3]/GPIO91
TS1DATA_[4]/GPIO92
TS1DATA_[5]/GPIO93
TS1DATA_[6]/GPIO94
TS1DATA_[7]/GPIO95

FE_TS_CLK
FE_TS_VAL_ERR
FE_TS_SYNC
FE_TS_DATA[0-7]

Internal demod out

S7LR_DIVX_MS10
IC101-*1
LGE2111-TE

GPIO036 GPIO037 GPIO038 GPIO039 GPIO040 GPIO041 GPIO042 GPIO045 GPIO046 GPIO049 GPIO050 GPIO051 GPIO052 GPIO073 GPIO074

LVA0P LVA0N LVA1P LVA1N LVA2P LVA2N LVA3P LVA3N LVA4P LVA4N LVB0P LVB0N LVB1P LVB1N LVB2P LVB2N LVB3P LVB3N LVB4P LVB4N LVACKP LVACKN LVBCKP LVBCKN

GPIO196 GPIO193 GPIO194 GPIO195

DIMMING

A_DIM
PWM_DIM
R156 10K
R157 100
C111 2.2uF
PWM0
PWM2

I2C

+3.3V_Normal

R140 R141 R160 2.7K R161 2.7K R144 2.2K R145 2.2K

AMP_SDA
AMP_SCL
I2C_SDA
I2C_SCL
SENSOR_SDA
SENSOR_SCL

NAND_FLASH_1G_HYNIX
EAN35669102
IC102-*1
H27U1G8F2BTR-BC

NAND_FLASH_1G_SS
EAN61857001
IC102-*2
K9F1G08U0D-SCB0

NAND_FLASH_1G_TOSHIBA
EAN61508001
IC102-*3
TC58NVG0S3ETA0BBBH

NC_1 NC_2 NC_3 NC_4 NC_5 NC_6 R/B RE CE NC_7 NC_8 VCC_1 VSS_1 NC_9 NC_10 CLE ALE WE WP NC_11 NC_12 NC_13 NC_14 NC_15

NC_29 NC_28 NC_27 NC_26 I/O7 I/O6 I/O5 I/O4 NC_25 NC_24 NC_23 VCC_2 VSS_2 NC_22 NC_21 NC_20 I/O3 I/O2 I/O1 I/O0 NC_19 NC_18 NC_17 NC_16

IC103-*1
CAT24C08WI-GT3-H-RECV(TV)

NC_1 NC_2 A2 VSS | VCC WP SCL SDA

HDCP_EEPROM_ON_SEMI_NEW

HDCP EEPROM

IC103
CAT24WC08W-T
HDCP_EEPROM_CATALYST_OLD
$0.199

+3.3V_Normal
Addr:10101--

R113 4.7K
A0 A1 A2 VSS | VCC WP SCL SDA
C107 0.1uF
R127 4.7K
R128 22
R129 22
I2C_SCL
I2C_SDA

EEPROM

IC104
AT24C256C-SSHL-T
A0'h

+3.3V_Normal
C105 0.1uF
A0 A1 A2 GND | VCC WP SCL SDA
R111 22 I2C_SCL
R112 22 I2C_SDA
C104 8pF OPT
C106 8pF OPT

PM MODEL OPTION

+3.5V_ST
R174 10K TOUCH_KEY
R177 10K PWM_BUZZ/IIC_LED
R178 OPT 100
R179 OPT 100
PM_MODEL_OPT_0
PM_MODEL_OPT_1
R175 10K TACT_KEY
R176 10K PWM_LED

S7LR_DIVX_MS10
IC101
LGE2112-T8

NEED TO SWAP LVDS POLARITY

GPIO036 GPIO037 GPIO038 GPIO039 GPIO040 GPIO041 GPIO042 GPIO045 GPIO046 GPIO049 GPIO050 GPIO051 GPIO052 I2C_SCKM0/GPIO53 I2C_SDAM0/GPIO54 GPIO73 GPIO74

AMP_RESET
5V_DET_HDMI_1
5V_DET_HDMI_2
5V_DET_HDMI_4
AV_CVBS_DET
DSUB_DET
SC1/COMP1_DET
HP_DET
SIDEAV_DET
TUNER_RESET
MODEL_OPT_0
MODEL_OPT_1
AMP_SCL
AMP_SDA
MODEL_OPT_2
DEMOD_RESET

EDID_WP
Q807 2SC3052
R171 10K
R172 0OT 0
R173 0OT 0

LVA0P LVA0N LVA1P LVA1N LVA2P LVA2N LVA3P LVA3N LVA4P LVA4N LVB0P LVB0N LVB1P LVB1N LVB2P LVB2N LVB3P LVB3N LVB4P LVB4N LVACKP LVACKN LVBCKP LVBCKN

RXA0- RXA0+ RXA1- RXA1+ RXA2- RXA2+ RXA3- RXA3+ RXA4- RXA4+ RXB0- RXB0+ RXB1- RXB1+ RXB2- RXB2+ RXB3- RXB3+ RXB4- RXB4+ RXACK- RXACK+ RXBCK- RXBCK+

GPIO196 GPIO193 GPIO194 GPIO195

MODEL_OPT_3
MODEL_OPT_4
MODEL_OPT_5

OLP
OLP TP100
applied on only SMALL PCB

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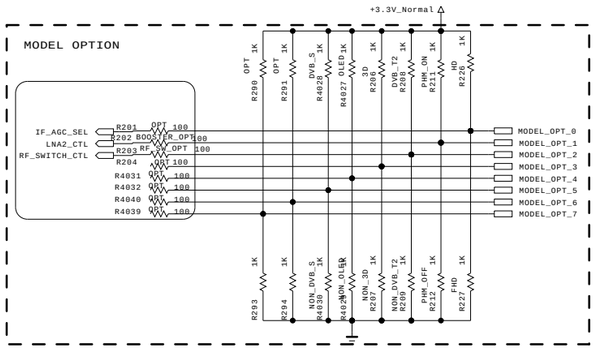
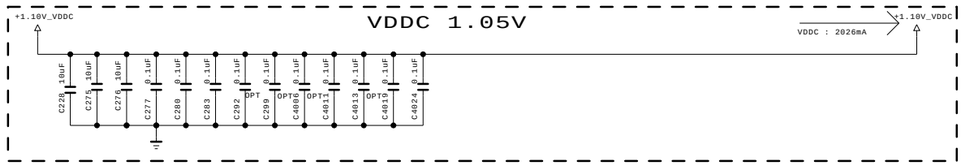
LG ELECTRONICS

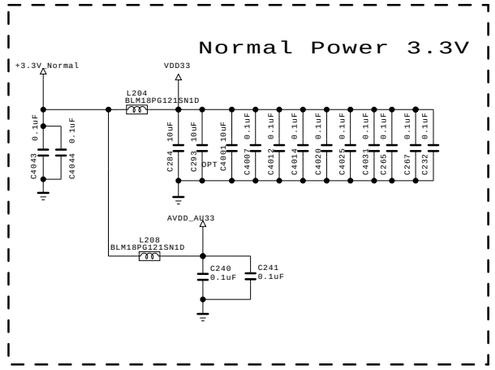
MODEL	GP3_S7LR	DATE	20110511
BLOCK	FLASH/EEPROM/GPIO	SHEET	1

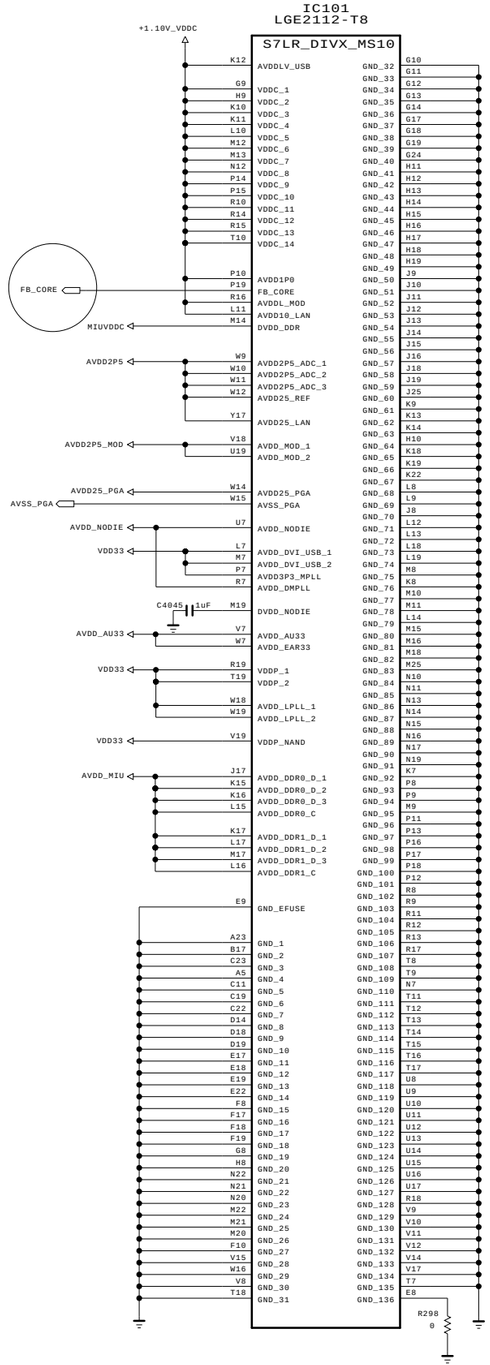
MODEL OPTION

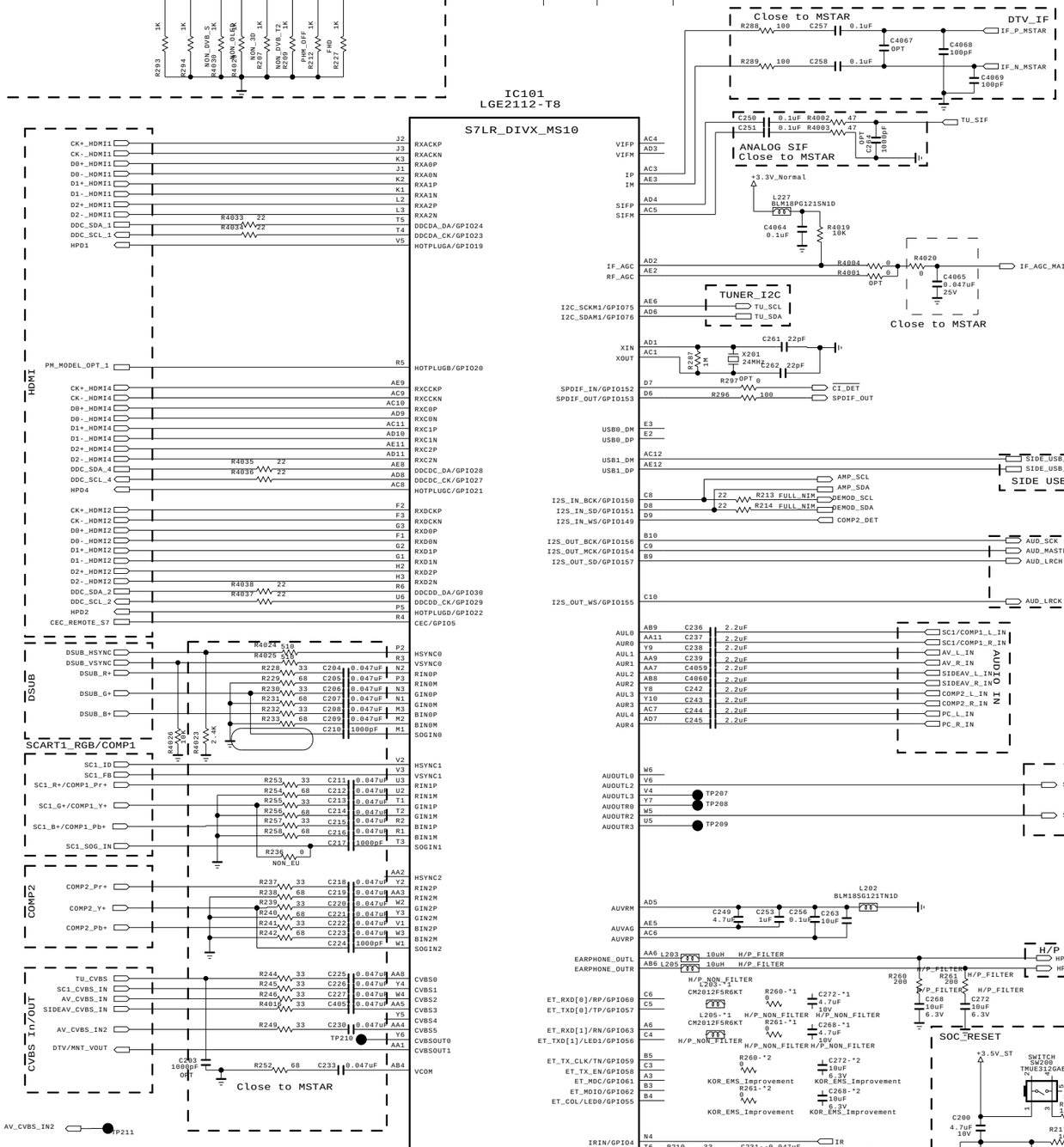
PIN NAME	PIN NO.	LOW	HIGH
MODEL_OPT_0	AB3	FHD	HD
MODEL_OPT_1	F4	PHM_OFF	PHM_ON
MODEL_OPT_2	AB2	NON_DVB_T2	DVB_T2
MODEL_OPT_3	T25	NON_3D	3D
MODEL_OPT_4	U23	NON_OLED	OLED
MODEL_OPT_5	T24	NON_DVB_S	DVB_S
MODEL_OPT_6	B8	READY	READEY
MODEL_OPT_7	A8	READY	READY

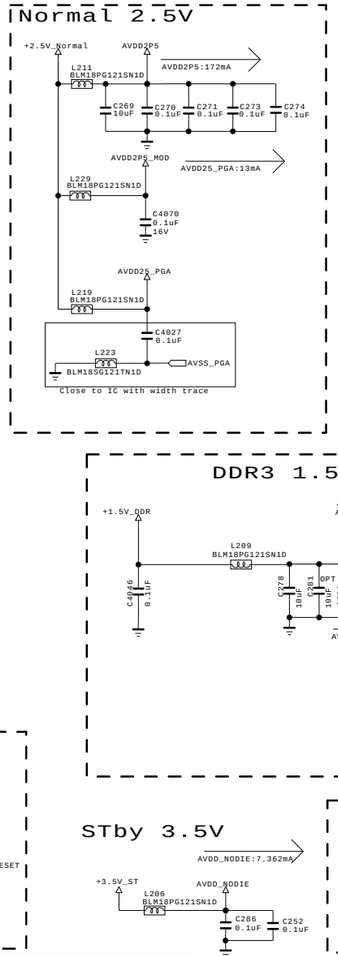


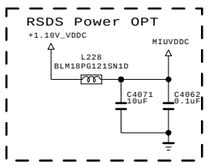












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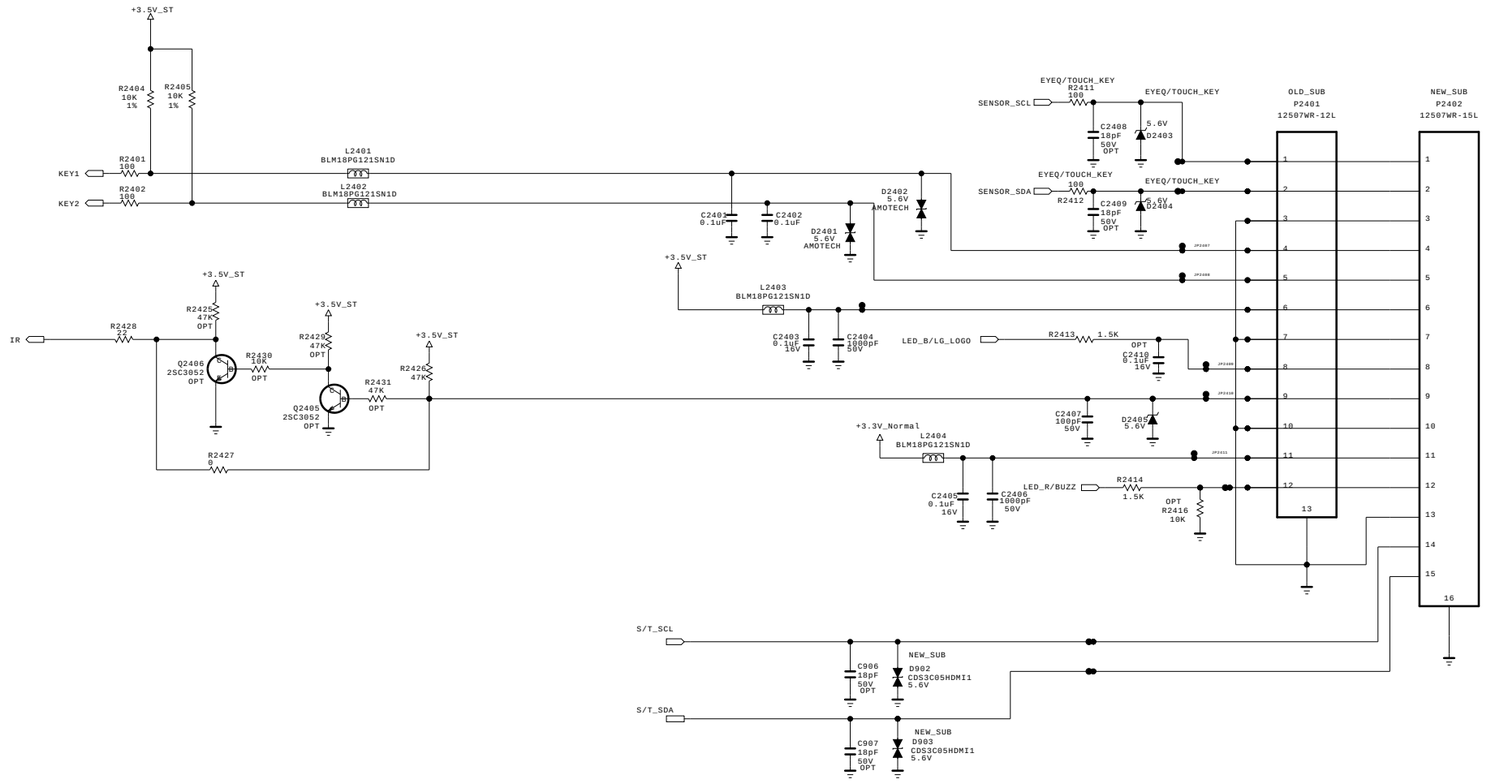
MODEL	GP3_S7LR	DATE	20110511
BLOCK	MAIN2, HW OPT	SHEET	2

CONTROL

IR & LED



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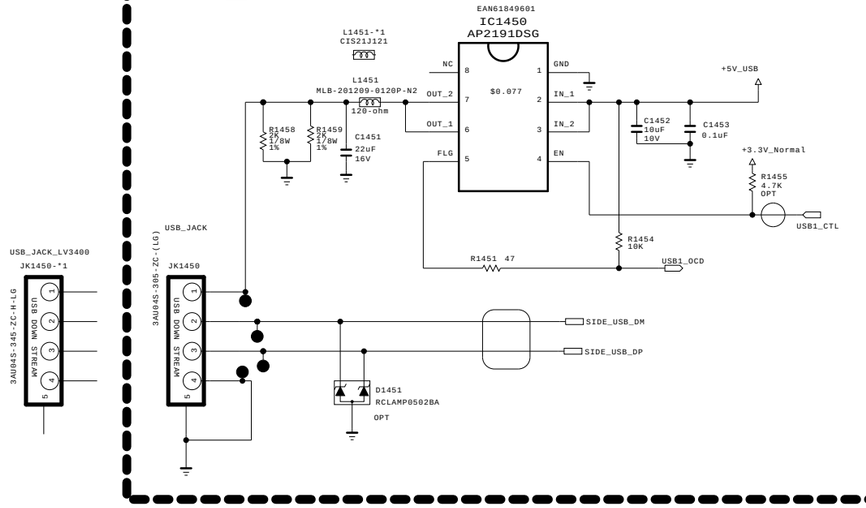
LG ELECTRONICS

MODEL	GP3_S7LR	DATE	20110324
BLOCK	IR/CONTROL-L	SHEET	6

USB_DIODES



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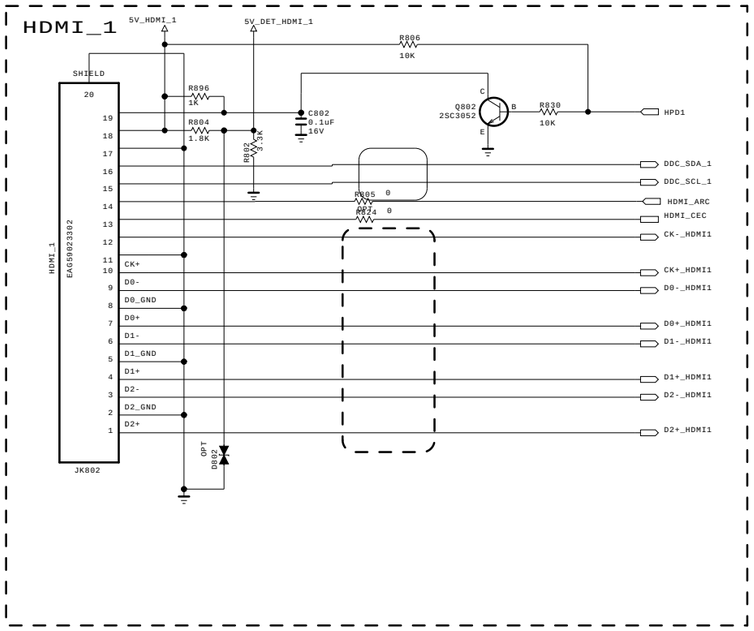
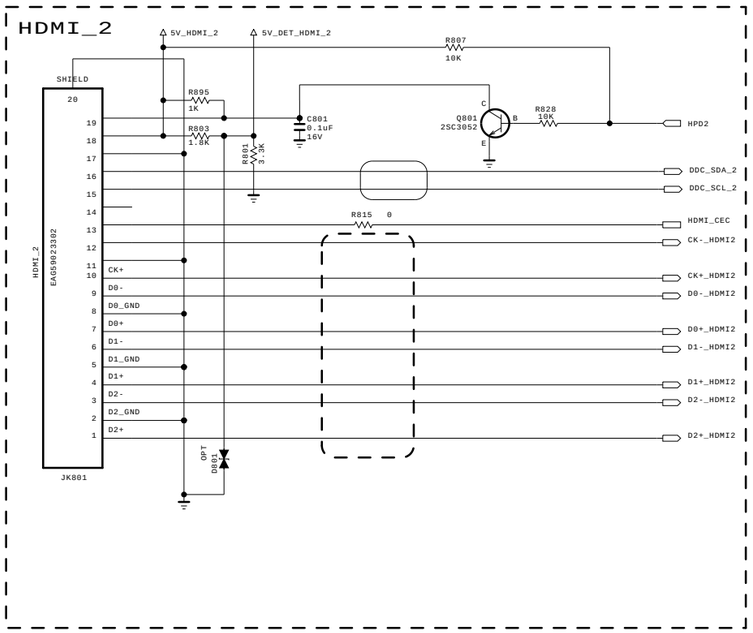
MODEL	GP2R	DATE	20101023
BLOCK	USB_OCP_DIODE	SHEET	7 /

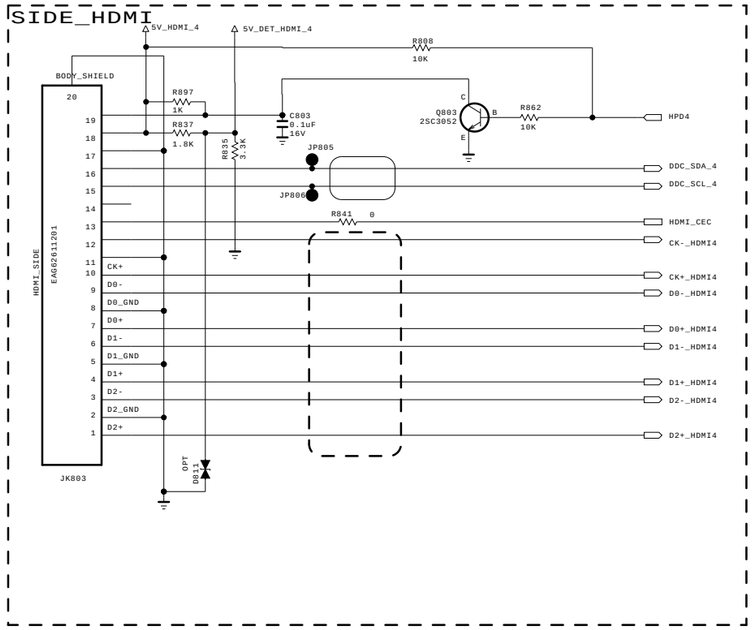
HDMI_1



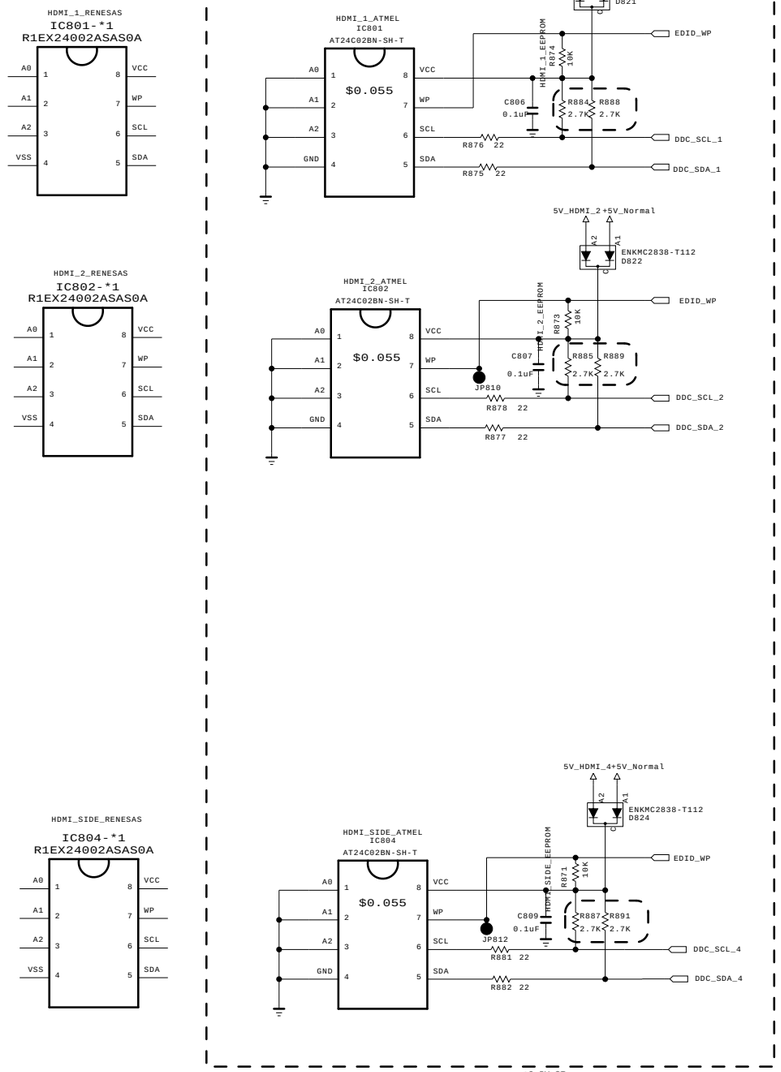
HDMI_2



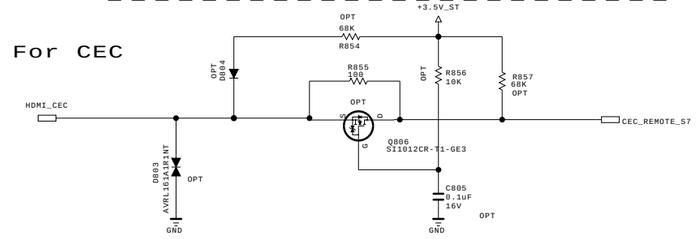
SIDE_HDMI



HDMI EEPROM



For CEC



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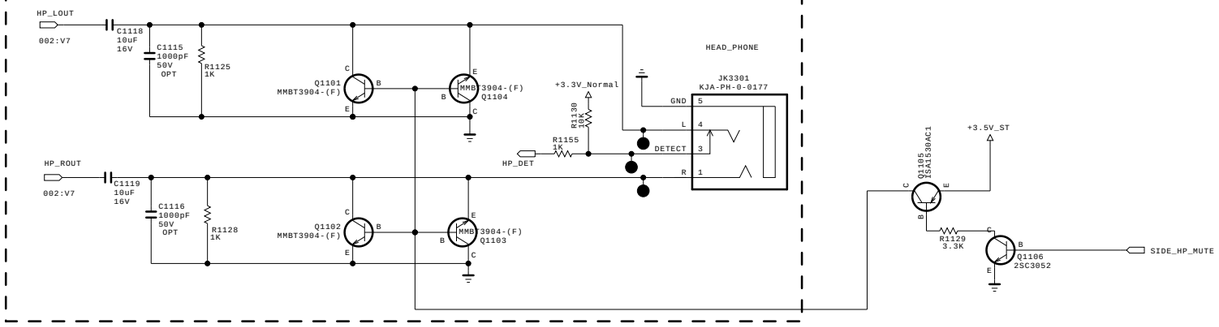
MODEL	GP3_S7LR	DATE	20110324
BLOCK	HDMI	SHEET	8

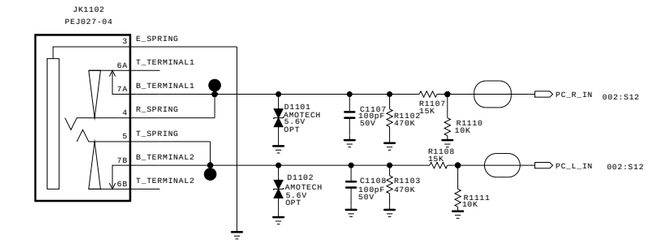
RGB/SPDIF/PC/HP

New Item Development

EARPHONE BLOCK

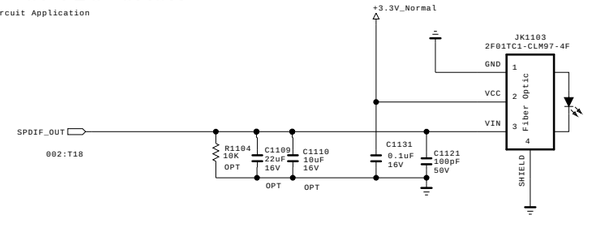


PC AUDIO

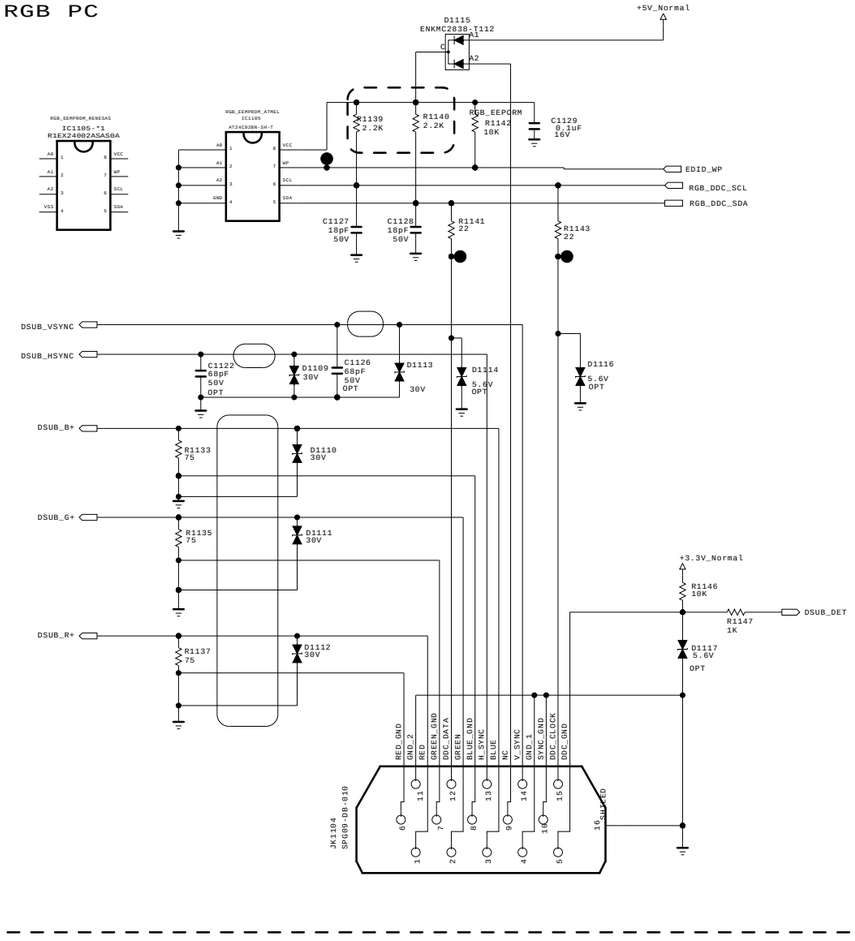


SPDIF OPTIC JACK

5.15 Mstar Circuit Application



RGB PC



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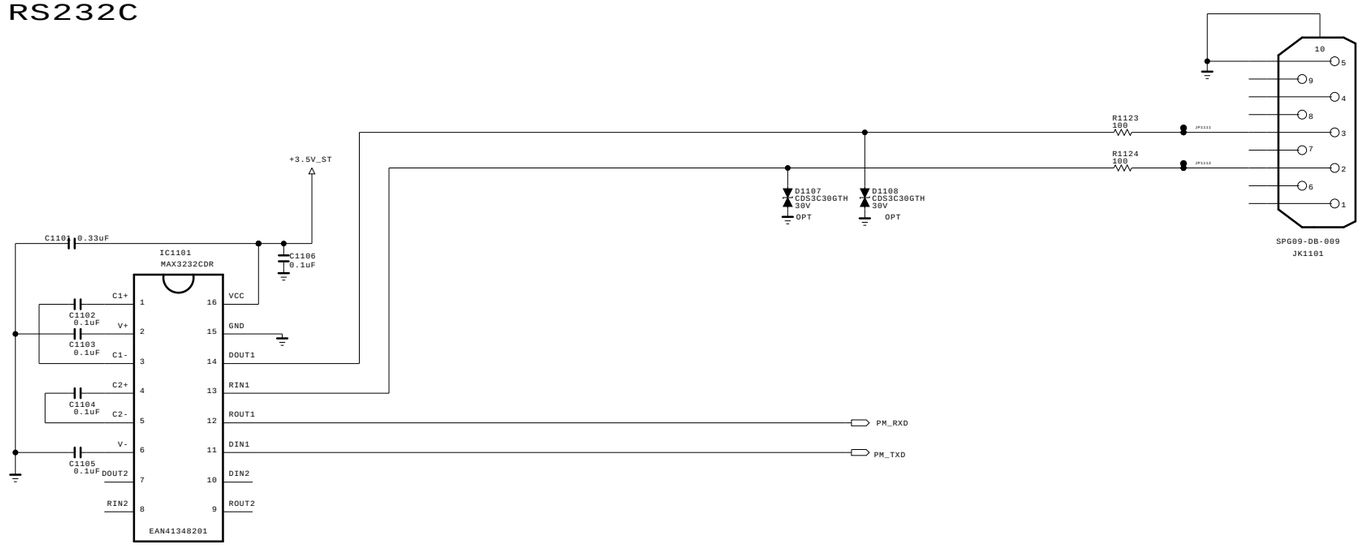
LG ELECTRONICS

MODEL	GP3_S7LR	DATE	20110324
BLOCK	RGB/SPDIF/HP	SHEET	9

RS232C



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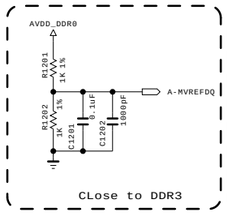
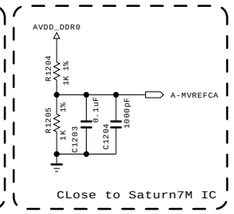
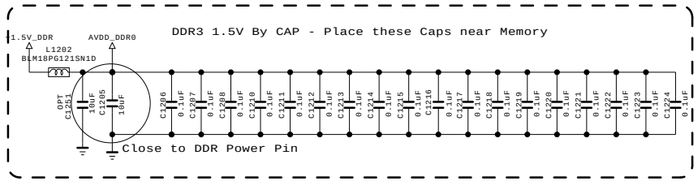
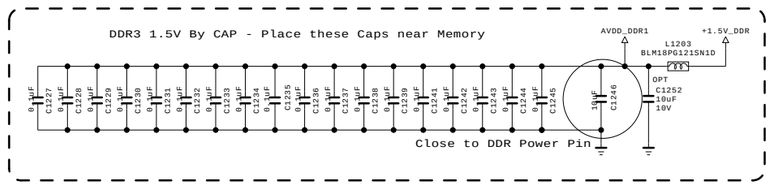
LG ELECTRONICS

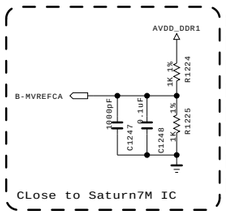
MODEL	GP3_S7LR	DATE	20110324
BLOCK	RS232C_9PIN	SHEET	10

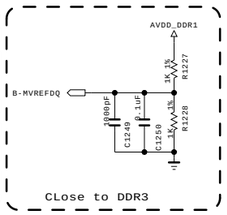


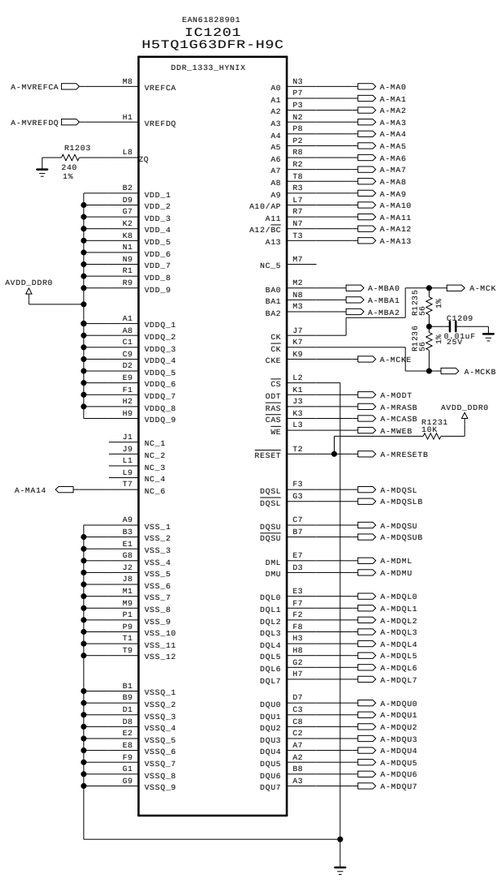


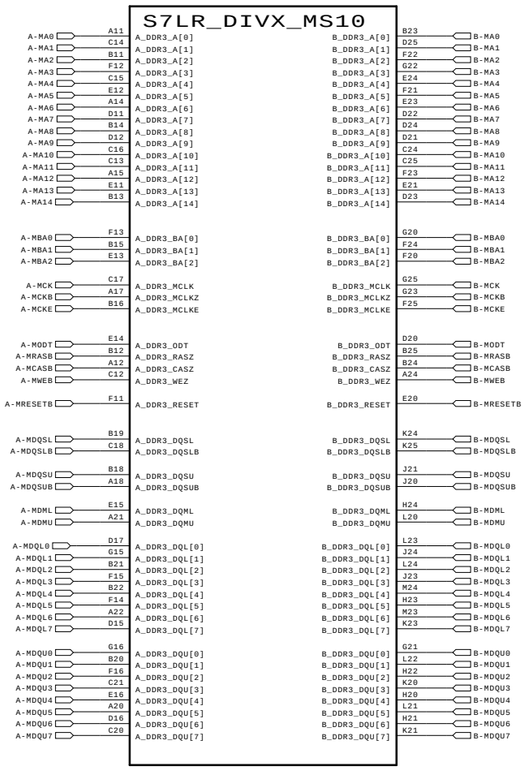


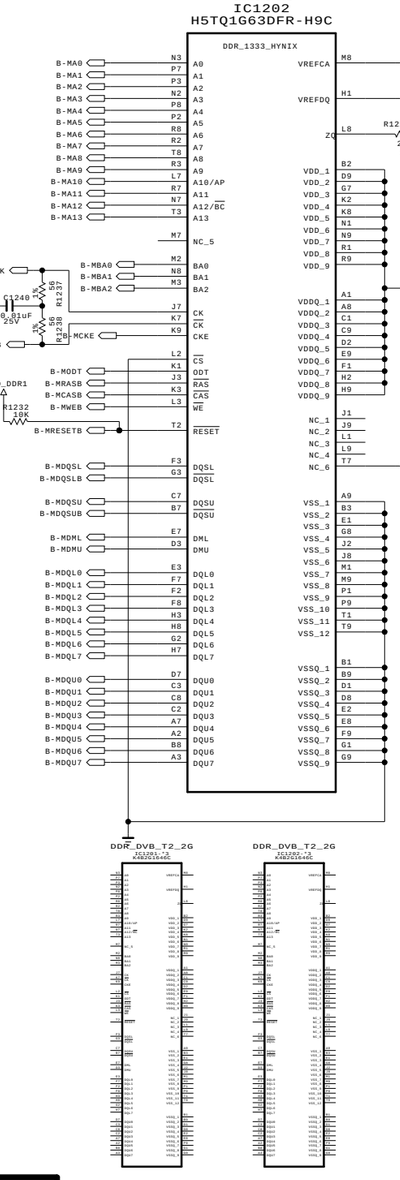


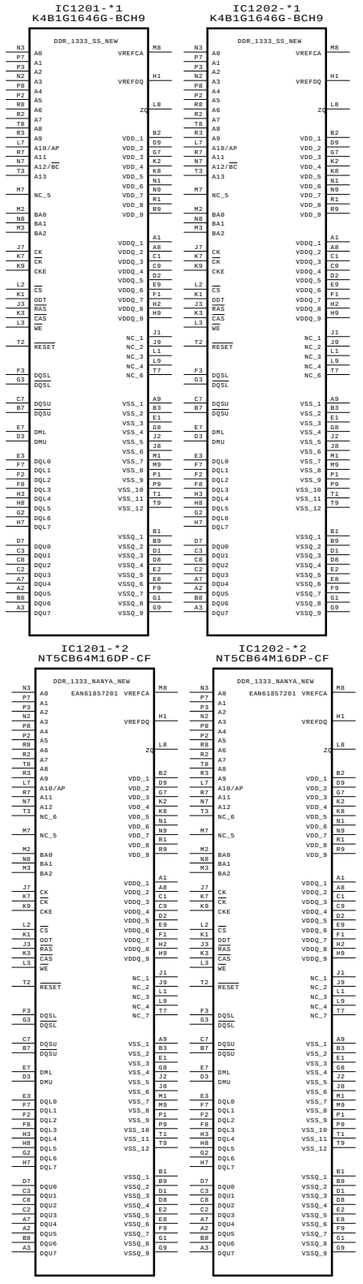












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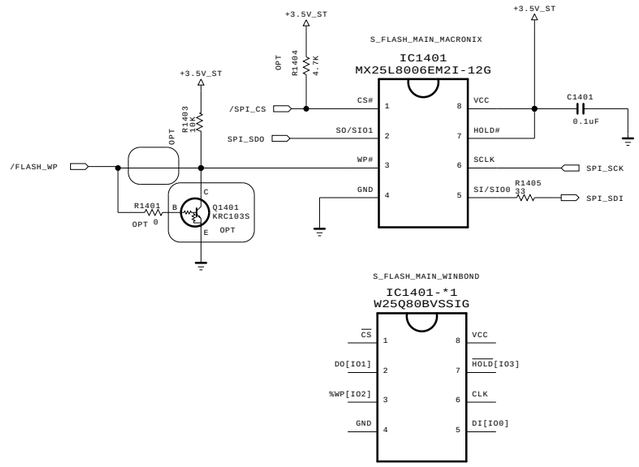
SECRET

LGElectronics

LG ELECTRONICS

MODEL	GP3_S7LR	DATE	20110511
BLOCK	DDR_256	SHEET	12 /



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SECRET
LGElectronics

LG ELECTRONICS

MODEL	GP3_S7LR	DATE	20110324
BLOCK	SFLASH	SHEET	13

GP4R_GLOBAL_TUNER_BLOCK

TU3700
TDSS-G101D
SI2176_DVB_1INPUT_H

TU3702
TDTJ-S001D
DVB_1INPUT_H_LGIT

TU3701
TDFR-C036D
CN_2INPUT_H_LG3911

close to TUNER

close to TUNER

close to IF line

close to the tuner pin, add,09029

Close to the tuner

Close to the CI Slot

GPIO must be added.

Pull-up can't be applied because of MODEL_OPT_2

BOOSTER : CHINA OPT

OPTION : RF AGC

The pull-up/down of LNA2_CTL is depended on MODLE_OPT_1. GPIO must be added for FE_BOOSTER_CTL

should be guarded by ground

1. should be guarded by ground
2. No via on both of them
3. Signal Width >= 12mils
   Signal to Signal Width = 12mils
   Ground Width >= 24mils

This was being applied to the only china demod, so this has to be deleted in both main and ISDB sheet.

Please, check Multi Item! 10/12

location movement,0929

TUNER MULTI-OPTION

TU3702-*2
TDTR-T036F

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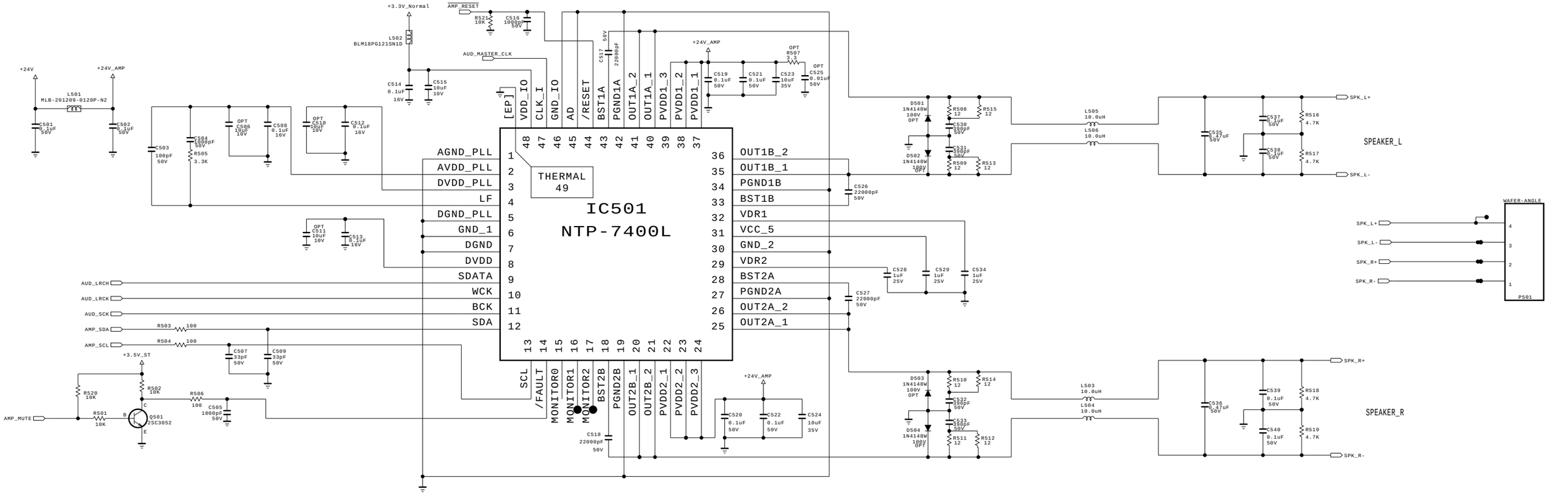
SECRET
LGElectronics

LG ELECTRONICS

MODEL	GP3_S7LR	DATE	20110511
BLOCK	TUNER_L	SHEET	14



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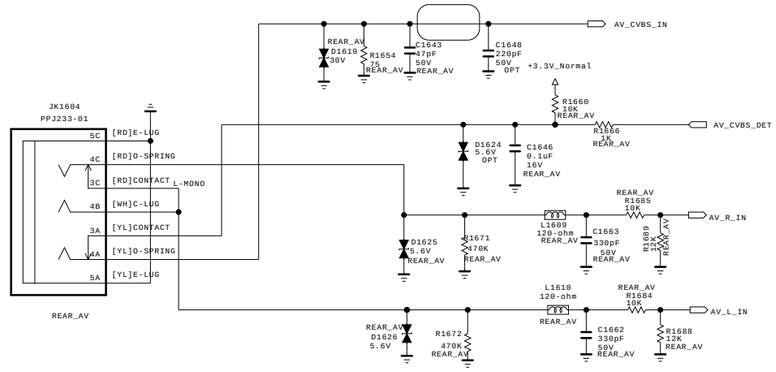
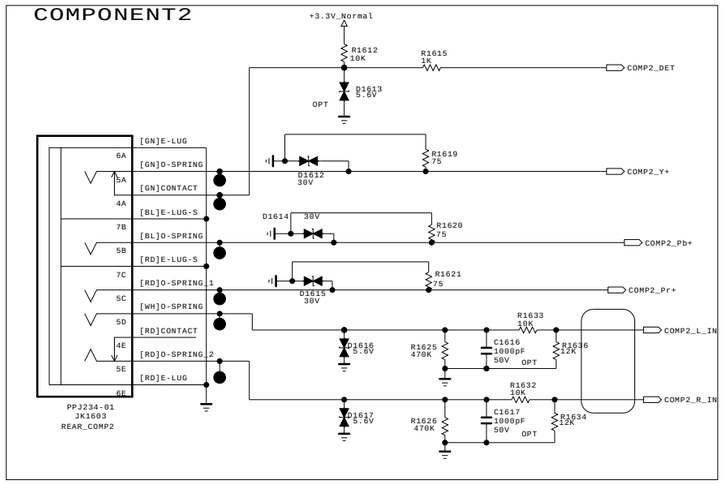
LGElectronics

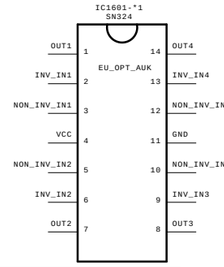
LG ELECTRONICS

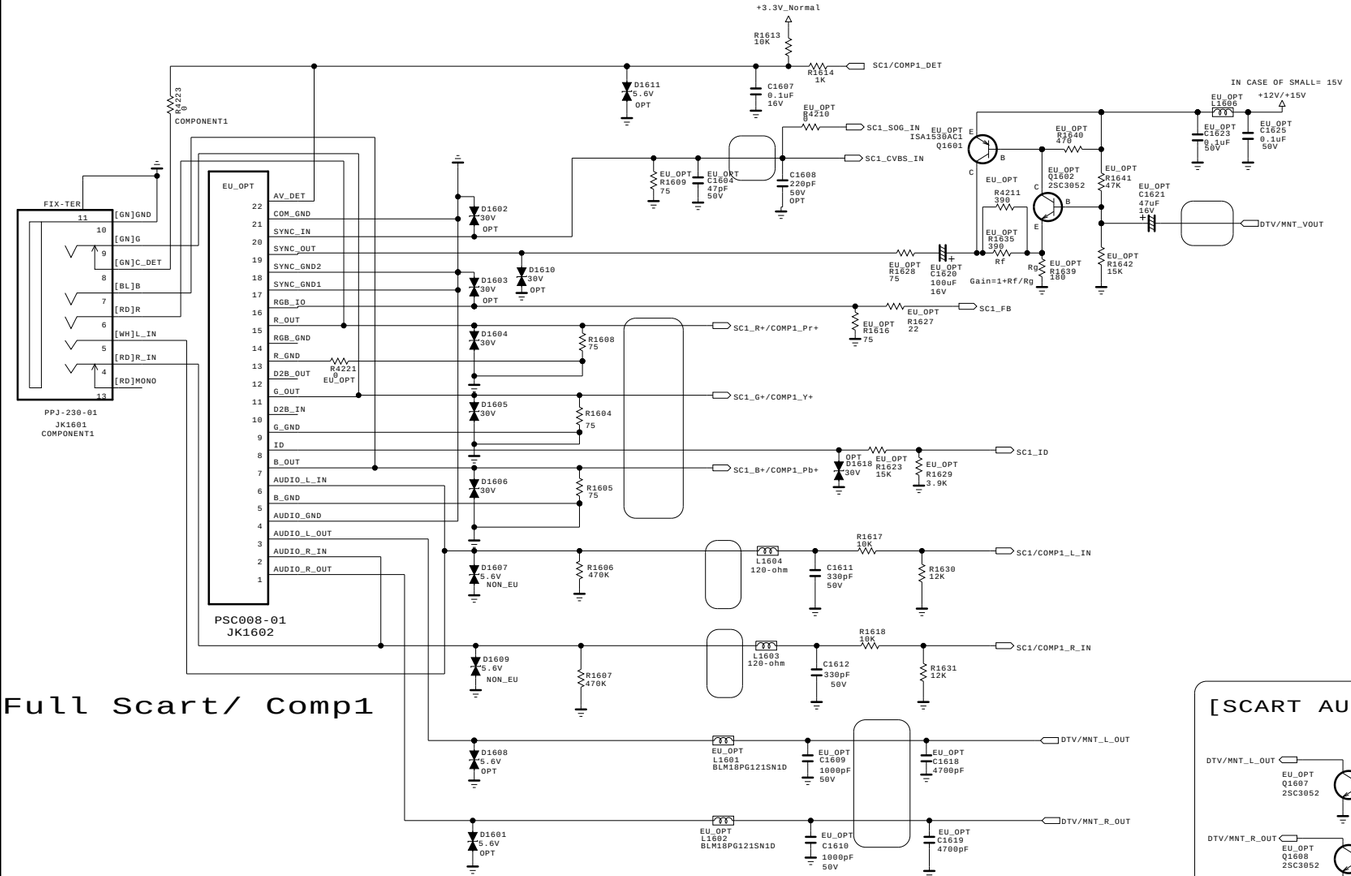
MODEL	GP3 S7LR	DATE	20110324
BLOCK	NTP7400	SHEET	16 /

Rear AV

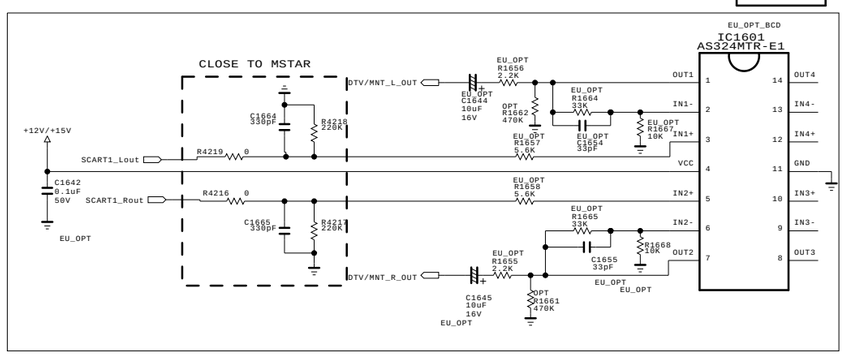


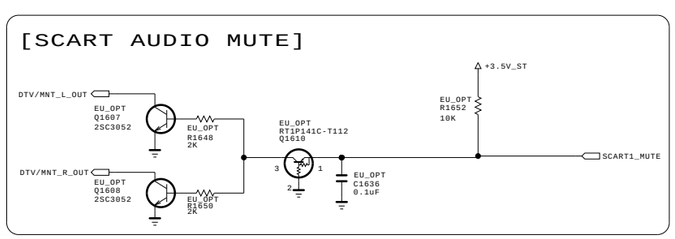






Full Scart/ Comp1





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SECRET

LGElectronics

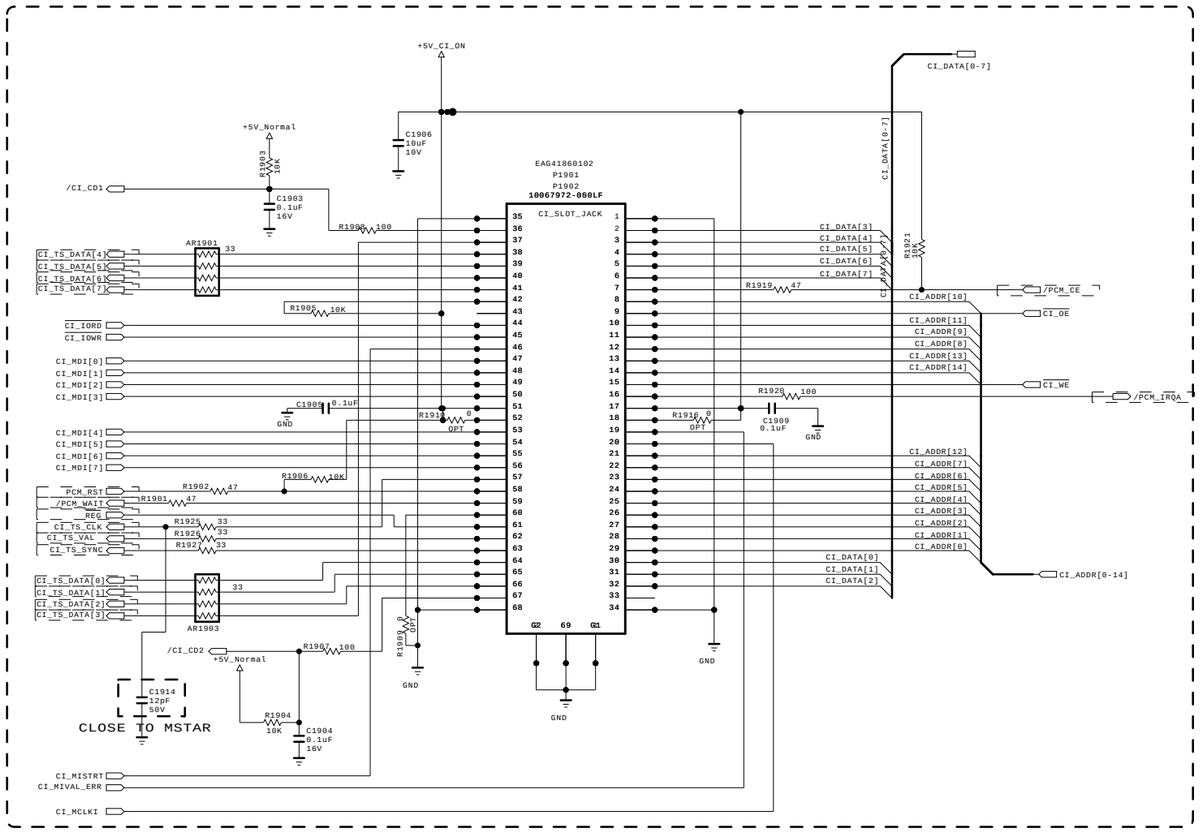
LG ELECTRONICS

MODEL	GP3_S7LR	DATE	20110324
BLOCK	REAR_JACK	SHEET	17 /

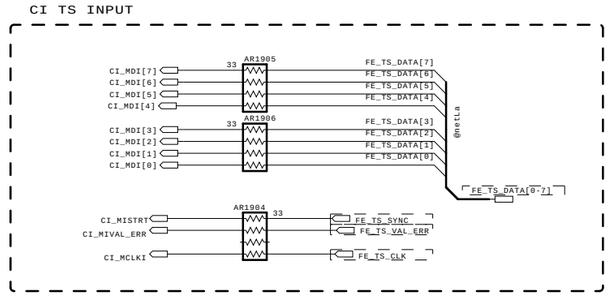
CI Region

* Option name of this page : CI_SLOT
(because of Hong Kong)

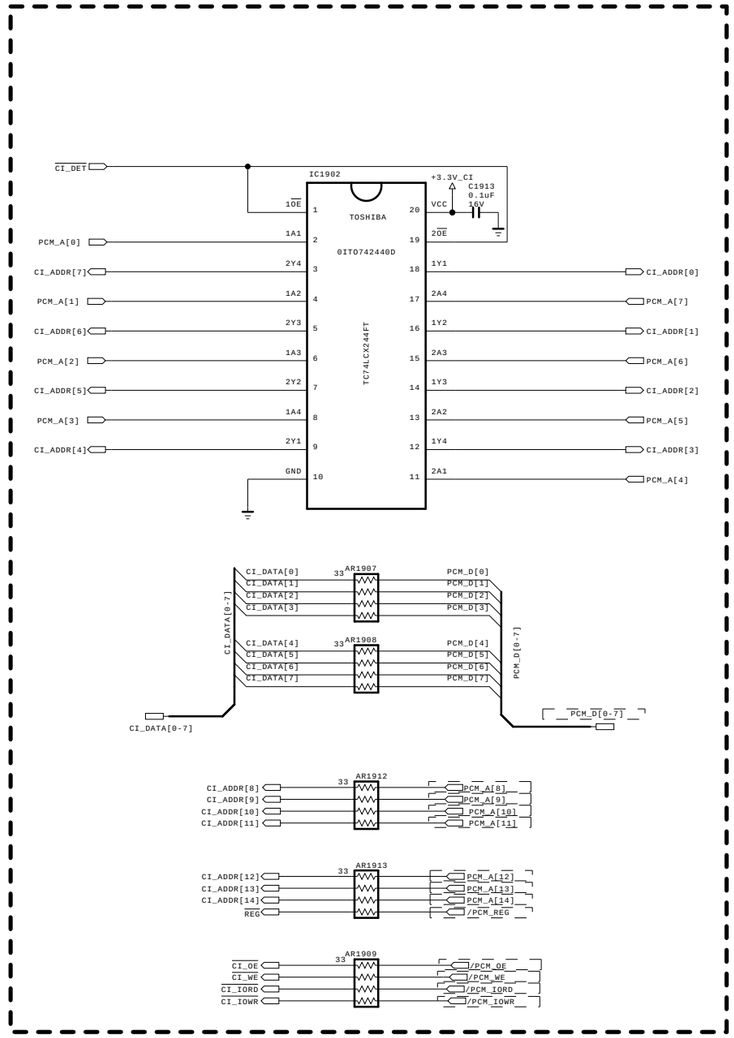
CI SLOT

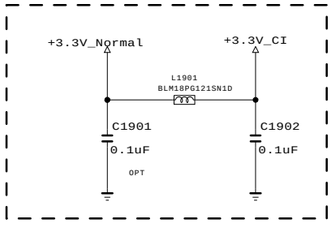


CI TS INPUT

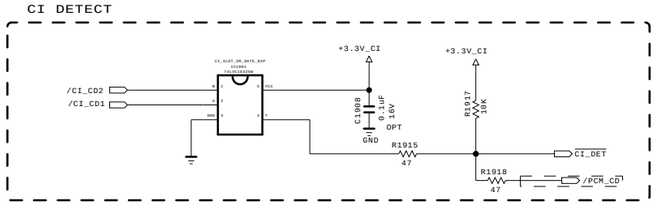


CI HOST I/F

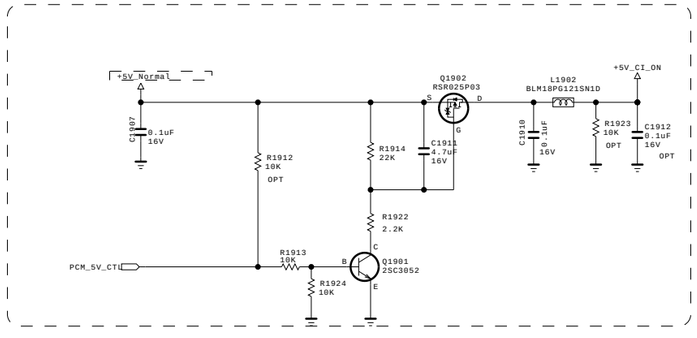




CI DETECT



CI POWER ENABLE CONTROL



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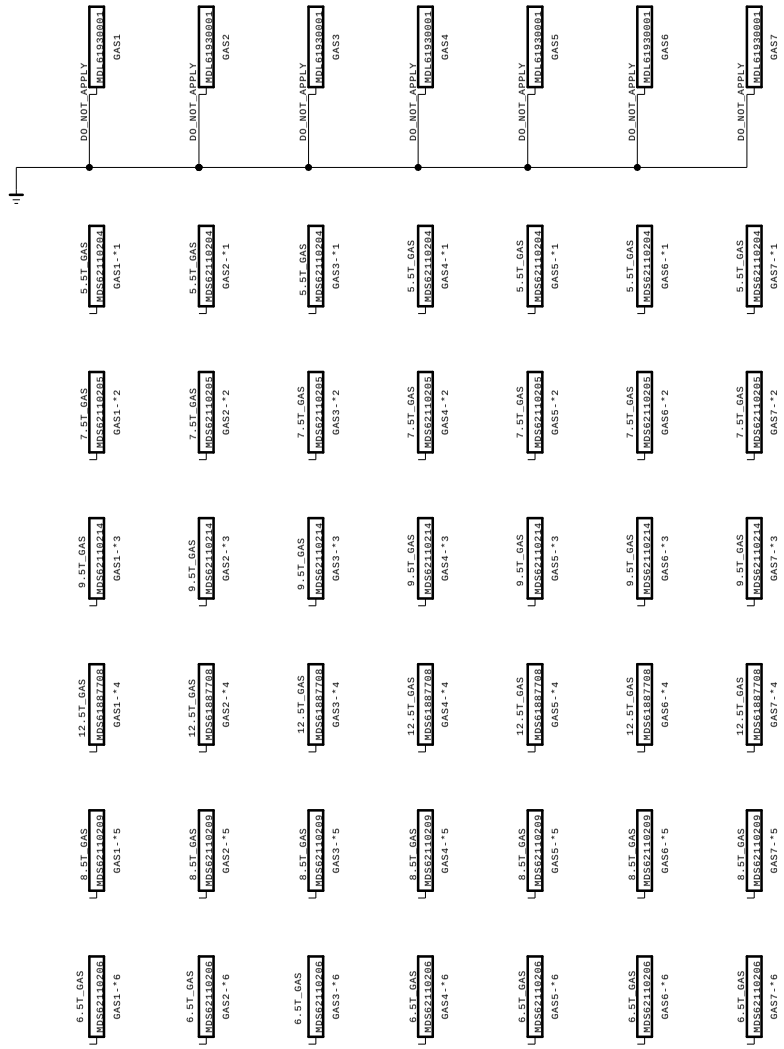
SECRET
LGElectronics

LG ELECTRONICS

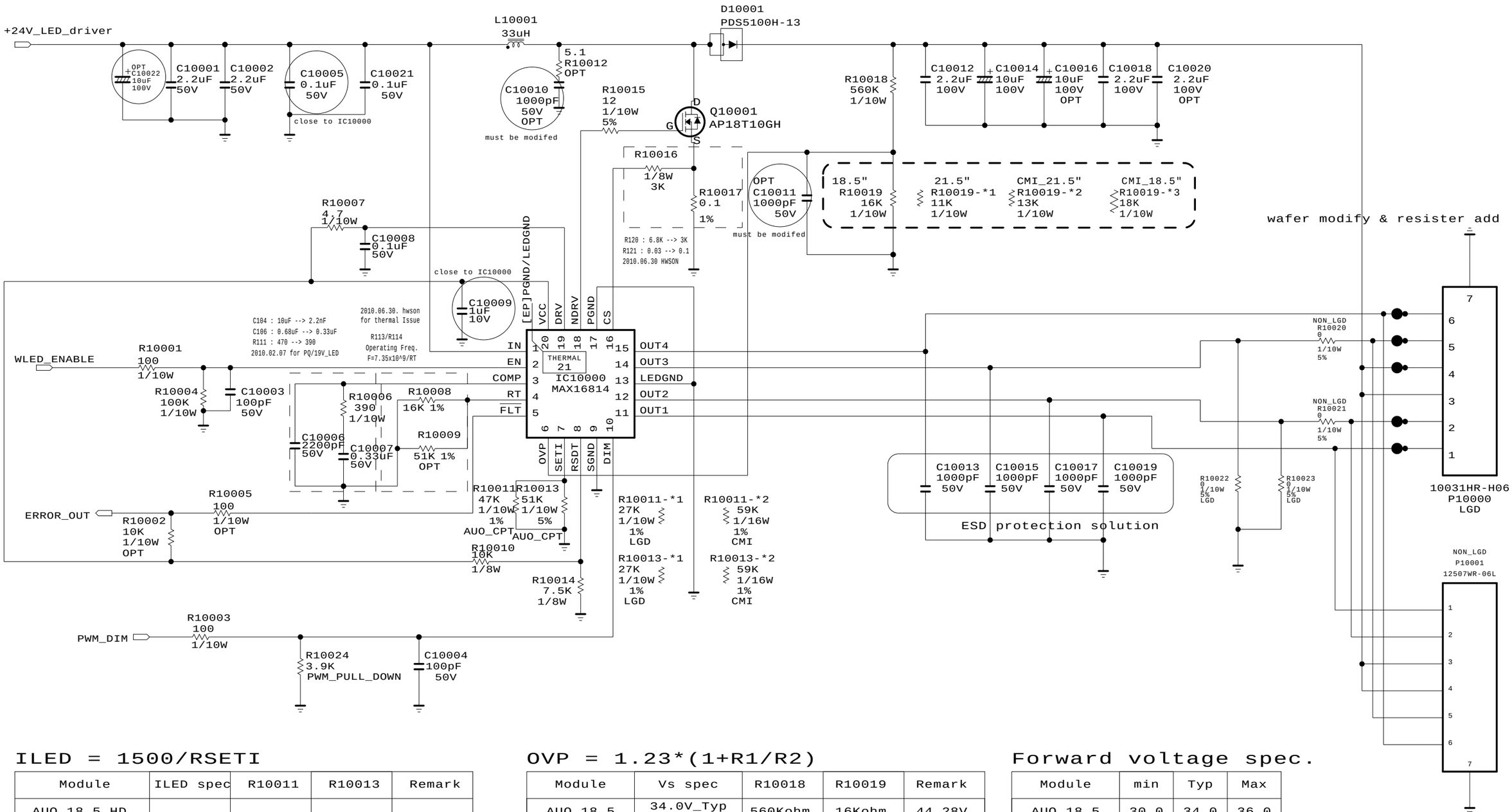
MODEL	GP3_S7LR	DATE	20110324
BLOCK	PCMCI	SHEET	20 /

SMD GASKET



MODEL	GP3_S7LR	DATE	20110324
BLOCK	SMD_GAS	SHEET	20 /

LED driver circuit for TN module



ILED = 1500/RSETI

Module	ILED spec	R10011	R10013	Remark
AUO_18.5_HD	60mA_Typ 63mA_Max	47Kohm	51Kohm	61.35mA
AUO_21.5_FHD				
CPT_21.5_FHD				
LGD_21.5_FHD	110mA_Typ 120mA_Max	27Kohm	27Kohm	111.11mA
CMI_18.5_HD	50mA_Typ 56mA_Max	59Kohm	59Kohm	50.85mA
CMI_21.5_FHD				

OVP = 1.23*(1+R1/R2)

Module	Vs spec	R10018	R10019	Remark
AUO_18.5	34.0V_Typ 36.0V_Max	560Kohm	16Kohm	44.28V
AUO_21.5	52.8V_Typ 57.6V_Max	560Kohm	11Kohm	63.85V
CPT_21.5	52.0V_Typ 57.6V_Max	560Kohm	11Kohm	63.85V
LGD_21.5	51.2V_Typ 56.0V_Max	560Kohm	11Kohm	63.85V
CMI_18.5	33.0V_Typ 34.0V_Max	560Kohm	18Kohm	39.50V
CMI_21.5	44.8V_Typ 47.6V_Max	560Kohm	13Kohm	54.21V

Forward voltage spec.

Module	min	Typ	Max
AUO_18.5	30.0	34.0	36.0
AUO_21.5	48.0	52.8	57.6
CPT_21.5	46.4	52.0	57.6
LGD_21.5	-	51.2	56.0
CMI_18.5	28.0	33.0	34.0
CMI_21.5	39.2	44.8	47.6

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SECRET

LGElectronics

LG ELECTRONICS

MODEL	S7LR SMALL TN	DATE	2011.05.09
BLOCK	LED driver	SHEET	29

LVDS_SMALL_TN

A_DIM

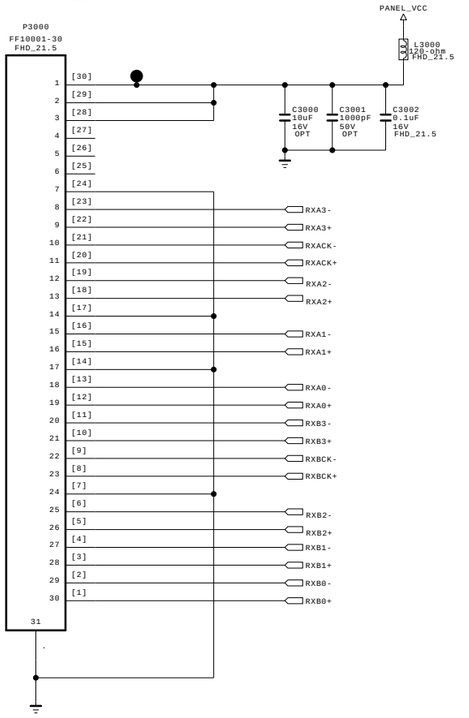
RXA4+

RXA4-

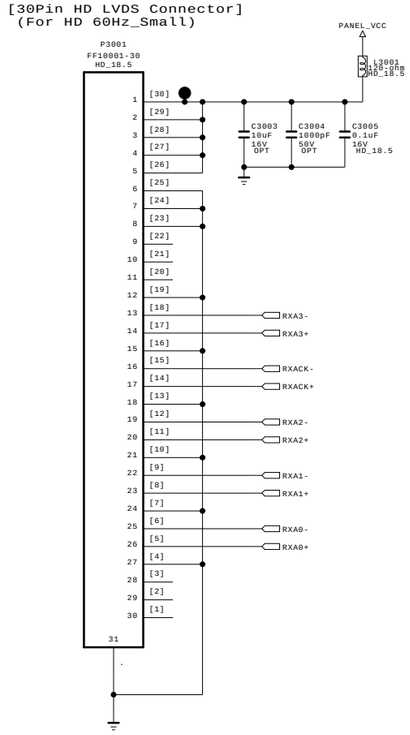
RXB4-

RXB4+

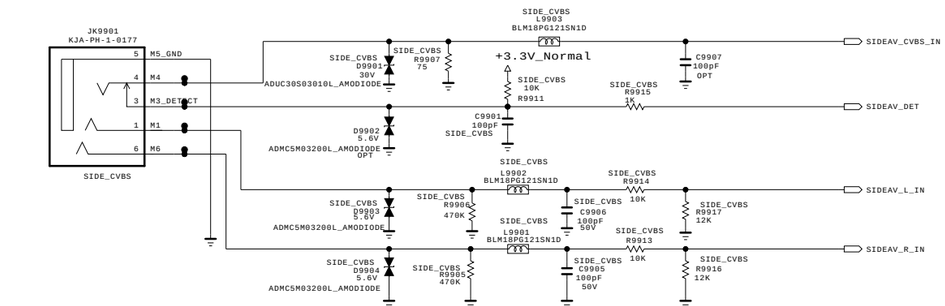
[30Pin FHD LVDS Connector]
(For FHD 60Hz_Small)



[30Pin HD LVDS Connector]
(For HD 60Hz_Small)



SIDE CVBS PHONE JACK
(New Item Development)

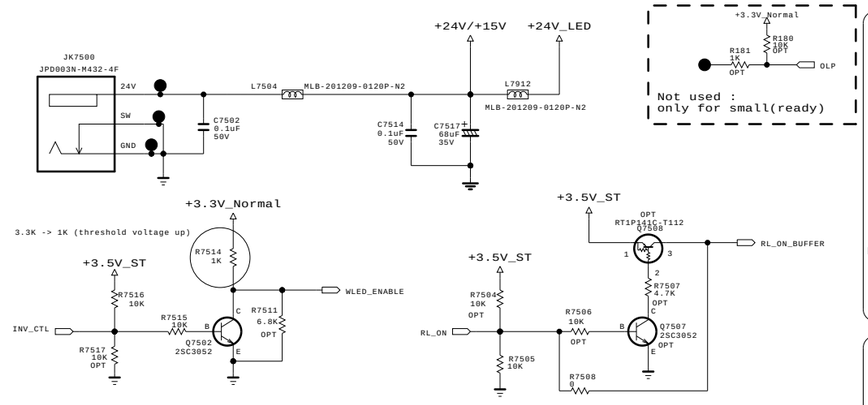


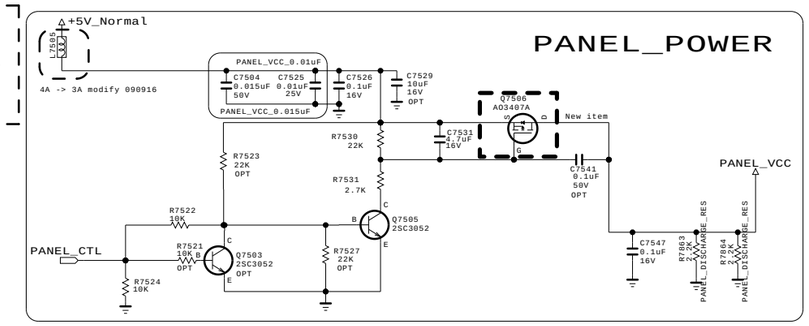
SECRET

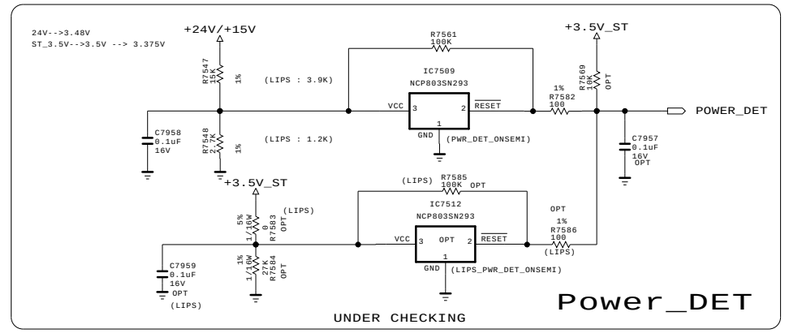
LGElectronics

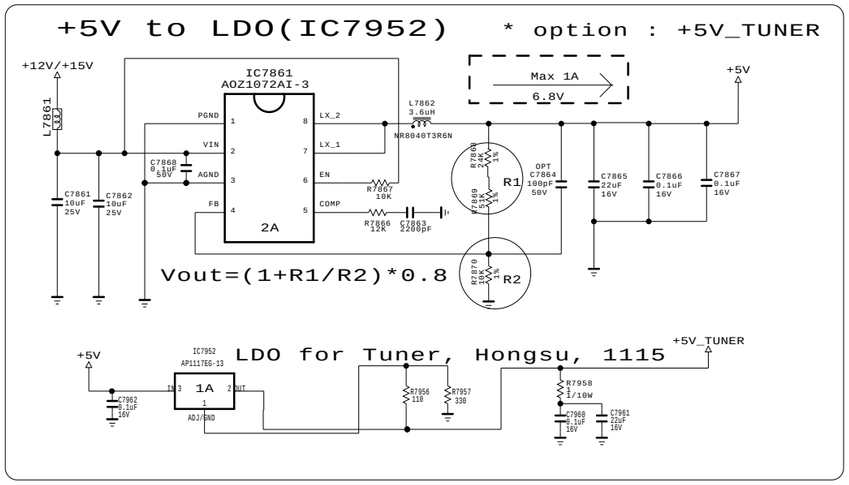
LG ELECTRONICS

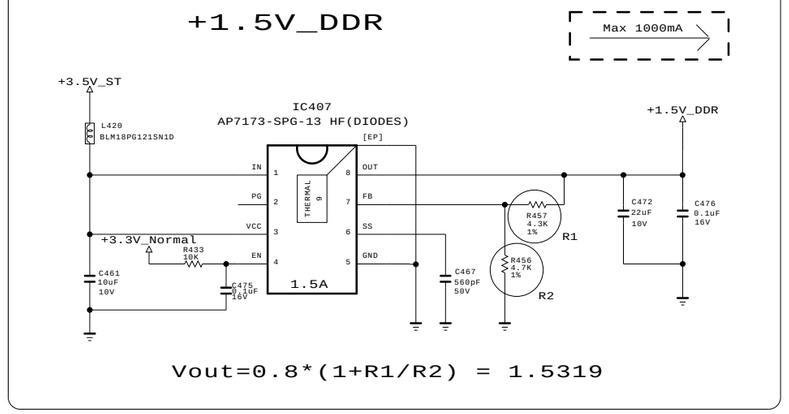
MODEL	S7LR SMALL TN	DATE	2011.05.10
BLOCK	LVDS&SIDE AV	SHEET	30

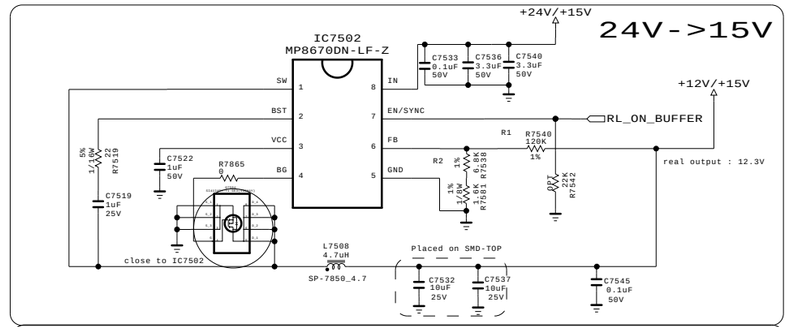


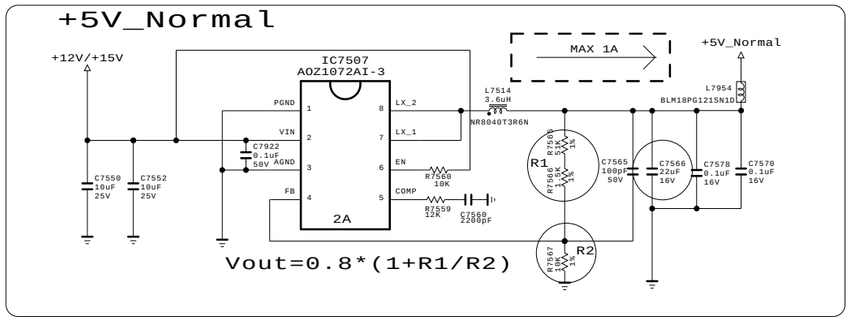


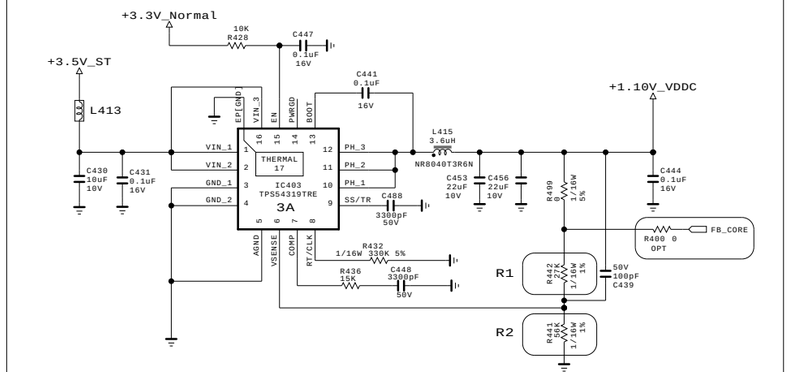


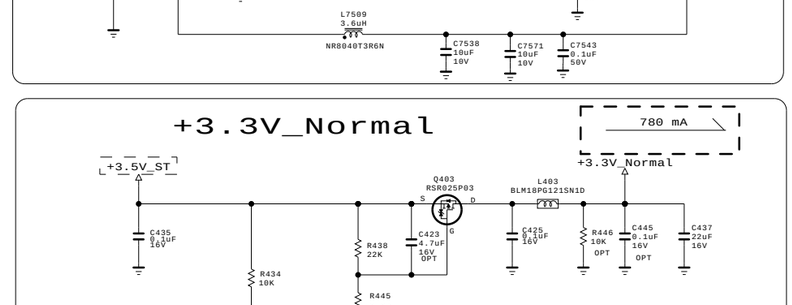


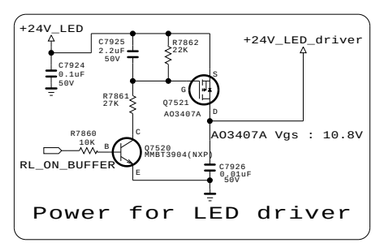


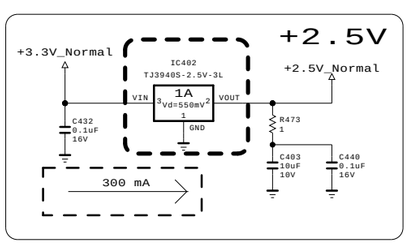


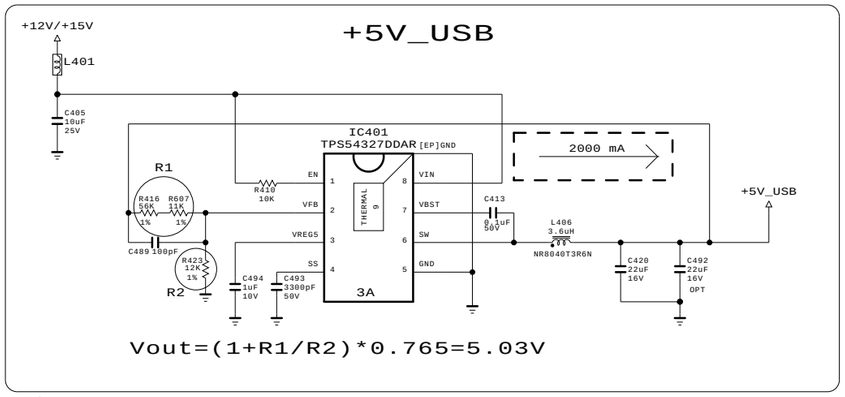












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SECRET

LGElectronics

LG ELECTRONICS

MODEL	S7LR SMALL TN	DATE	2011.06.17
BLOCK	POWER	SHEET	32


LG Electronics Inc.

Block Diagram: S7LR TN(일반)